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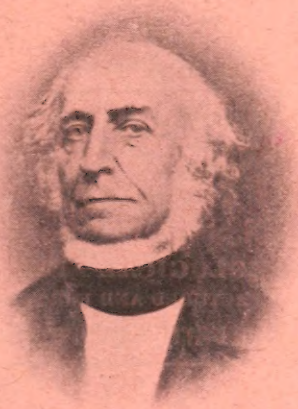

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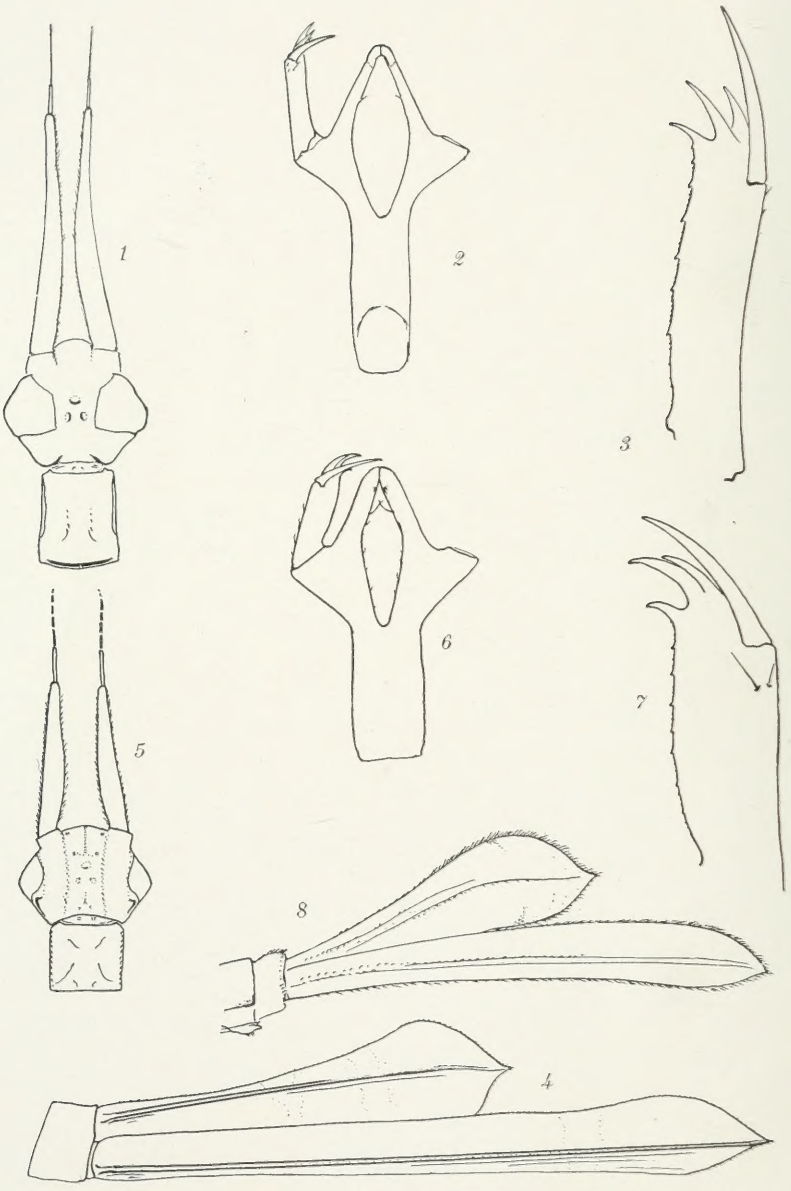


CALOPTERYGINE NYMPHS—NEEDHAM.

# ENTOMOLOGICAL NEWS

AND

## PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XXII. APRIL, 1911. NO. 4.


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## Descriptions of Dragonfly Nymphs of the Subfamily Calopteryginae (Odonata).


BY JAMES G. NEEDHAM, Cornell University, Ithaca, N. Y.


(Plates IV, V.)

The basis of our present knowledge of the immature stages of this group of dragonflies was laid by Dr. Hagen in a paper but a few pages in length, published in 1880,* under the title *"Essai d'un Synopsis des Larves des Calopterygines."* Nymphs of *Calopteryx* had been described earlier, and in that genus and in *Hetaerina* fuller descriptions have appeared since; but with the exception of a few undetermined forms described by Karsch in 1893 † and a few figures of nymphal labia published by Miss Hortense Butler in 1904, ‡ that little paper has until quite recently represented all our knowledge of the systematic relations of the immature stages of the group. Yet that paper was merely synoptic, without other descriptions than mere diagnostic statements of group characters, and it was not illustrated.

*In *C. R. Soc. Ent. Belg.*, Vol. 23, pp. lxv-lxvii. Abstracted by McLachlan, in *Ent. M. Mag.*, Vol. 17, p. 90; also in *Zool. Anz.*, Vol. 3, pp. 304-305.

† *Berl. Ent. Zeit.*, Vol. 38, pp. 47-48.

‡ *Trans. Amer. Ent. Soc.*, Vol. 30, pp. 127-128, pl. V, figs. 1-6.

During 1907 I had the privilege (due to the courtesy of Mr. Samuel Henshaw) of studying Hagen's specimens in the Museum of Comparative Zoology. Of two of the species of the Synopsis, (the *Euphaea splendens* of Ceylon and the fragment doubtfully referred to the genus *Cora*) I could find no trace. The others I found and studied, and also two additional members of the group here treated, not noticed by Hagen in that paper, and perhaps of later acquisition by him. By the study of the venation of the developing nymphal wings I was able to make closer determination of some of the forms, confirming his determination of *Neurobasis,* but finding his *Anisopleura comes* to be in fact a species of *Bayadera,* and his *Euphaea dispar?* to be probably *Anisopleura comes.* The new descriptions and figures of these forms made at that time were laid aside because other matters were more pressing. Recently Mr. Tillyard's rearing of the nymph of the Australian *Diphlebia lestoides,* * and Dr. Calvert's still more recent and most welcome discovery of the nymph of *Cora* † have revived my interest in the matter, and have led me to offer these notes and figures for publication in the NEWS.

The greatest interest has attached to the nymphs of the "Legion Euphaea" of de Selys, doubtless because of their possession of paired lateral filamentous tracheal gills on most of the abdominal segments (a character appearing in somewhat altered form in *Cora*). On this account one of Hagen's types was figured in Packard's Text-book of Entomology (p. 469). The figure is small and inadequate for specific determination; but since it shows no spines on the frons it perhaps represents the "Euphaea splendens" of the "Synopsis," which Hagen says was verified by Nietner, and which I was unable to find reposing in the collection at the time my studies were made. Tillyard has shown that *Diphlebia* lacks external paired lateral gills; and I am here describing another member of the "Legion" that lacks them, from Jamaica. The wing venation is not well enough preserved to render determination very cer-

*Proc. Linn. Soc., N. S. Wales,* Vol. 34, pp. 370-383, pl. 33, 1909.

† *Entom. News,* Vol. 22, pp. 49-64, 1911.

tain, and no Calopterygine other than *Hetaerina* is at present known from Jamaica. The characters of the caudate gills and of the mandibles are sufficiently interesting, even though the nymphs are not fully determinable.

Herewith I describe briefly and illustrate nymphs, I judge to belong to the following species: *Neurobasis chinensis* Linn; *Calopteryx angustipennis* Sel.; *Anisopleura comes* Hagen; *Bayadera indica* Sel.; Unknown nymph from Jamaica.

**Neurobasis chinensis** (supposition). (Plate IV, figs. 1-4.) Hagen, C. R. Soc. Ent., Belg., Vol. 23, p. lxv, 1880.

Several well grown nymphs in which the venation of the adult could be in part recognized in the wings enabling me to verify generically, at least, Dr. Hagen's supposition. No. 302, M. C. Z., "Billespur, Himalaya, India, Carleton, 1872."

Length, 30; lateral gills, 13 additional; median gill only 9 mm.; abdomen, 20; mind femur, 7 mm.; width of head, 3 mm.; of abdomen, 2.2 mm.

Body very elongate, slender and smooth. Head depressed, longer than wide, narrowed both ways from the laterally prominent eyes, and without dorsal tubercles. Antennae very long, the basal segment being about twice as long as the head is wide, fusiform, and pubescent, especially upon the inner side, the second segment about one-eighth as long as the first, and the remainder comprised in an unjointed slender and tapering flagellum, that is somewhat longer than the second joint. Labium slender, the hings reaching posteriorly to the mesothorax, basal half of the mentum with parallel sides, suddenly widening just beyond the middle to the bases of the lateral lobes, and then regularly narrowing to the greatly produced tip, the anterior half being occupied by a deep and wide oval median cleft, that is closed in front by the close apposition and partial adherence of the slender lobes that bound it; these lobes show a slight constriction near the tip, and there is a pair of spinules on the inner margins of the cleft at two-thirds its length. The median cleft descends through somewhat more than half the length of the mentum. The lateral lobes are very slender, almost linear, with doubly and finely serrate inner margin, ending in a slender and nearly straight hook, above which are two similar but larger hooks on end, and above these three that together terminate the lateral lobe is the usual movable hook on the external margin, with three minute spinules just before its base above.

Legs not remarkably long, but slender. Wing cases reaching the fourth abdominal segment. Abdomen long, cylindric. Gills long, straight, slowly tapering and then suddenly enlarged just before the tips, after which they are abruptly narrowed to the end, the lateral ones triquetral, the median flat, with a carina each side, and one-third shorter than the laterals.

**Calopteryx angustipennis** (supposition). (Plate IV, figs. 5-8.)

A single immature female specimen, M. C. Z., No. 307, "Green River, near Mammoth Cave, Ky., 4-11-'74, Putnam."

Length 20 mm., lateral gills 12 mm. additional, the median gill 9 mm., abdomen 13 mm., antenna 8 mm., of which the basal segment measures 5 mm., hind femur 8 mm., width of head 3 mm., of abdomen 2 mm.

Body very long and slender. Head about as long as wide, depressed and very flat above, with a prominent, angulately elevated and anteriorly directed tubercle behind each eye. Eyes small and situated at the midlateral margin of the head, and laterally prominent. Antennae very long, the basal segment densely pubescent and longer than the head is wide, the second segment one fourth as long as the first and the third to the seventh successively shorter and more slender. Labium very long and slender, the hinge reaching posteriorly to the metathorax; mentum with sides parallel in basal half, deeply and widely cleft in the greatly widened apical half into two slender lobes; these lobes are apposed at apex making an oval inclosure of the cleft; a pair of spinules, one each side, arise from the inner edges of the cleft at three-fourths its length. The lateral lobes are slender, with nearly parallel sides, the inner margin slightly convex and finely and doubly serrate, ending in a short arcuate end hook, that is separated by a deep cleft from two other larger similarly shaped hooks upon the end; above these hooks there is on the external margin the usual movable hook, which is larger and stouter and regularly arcuate; there is a pair of spinules on the lateral margin just before the base of the movable hook.

Legs very long and slender, each femur with a flattened prominence at the end upon its anterior face, that rests against the side of the tibia at its base, and is doubtless for leverage in these long legs. Wing cases reaching the middle of the 3d abdominal segment (young).

Abdomen cylindric, or very slightly tapering posteriorly, the lateral margins becoming prominent and spinulose on the 8th and 9th segments. Gills long, widest near the apex and suddenly tapering to the tips, spinulose margined, all slightly decurved, the middle one more

decidedly so, and becoming oblique at apex; lateral gills triquetral, the median, flatter and with a longitudinal carina upon either face.

General color yellowish green; some narrow longitudinal streaks and minute spots in pairs on the top of the head, and a broad black band extends from the base of the antenna to the thorax, including the eye. There are indications of paler transverse bands upon the gills and of subapical rings on the femora.

This species differs markedly from those hitherto known* in the form of the middle caudal gill-lamella, its greater brevity and apical widening and obliquity being very noticeable.

**Anisopleura comes** Hagen (supposition). (Plate V, figs. 1-3.)

Hagen, C. R., Soc. Ent. Belg., Vol. 23, p. lxvi, 1880, *"Euphaea dispar?"*

Carleton, M. C. Z., No. 301, India.

Length 21 mm., gills 9 mm. additional, abdomen 11 mm., hind femur 5 mm., width of head 5 mm., of abdomen 4 mm.

Body rather stout. Coloration lost, owing to action of alcohol. Antennae rather stout, 7-jointed, the relative lengths of the segments being as 1:1:1.3:1:.8:.6:.5. Mandibles conspicuously biramous, the outer branch about as large as the inner projecting forward at the sides of the mouth outside as in generalized members of the Ephemerinae. Labium very similar to that of *Bayadera* shown in fig. 6 of plate V. Its lateral lobe differing slightly in the proportions of the end hooks, fig. 3.

Legs stout, thinly fringed with hairs along the superior longitudinal carinae. Wing-cases reaching the middle of the 5th abdominal segment. Abdomen slowly tapering posteriorly, bearing simple paired filamentous gills at the sides of the 2nd to the 8th segments. Caudal gills (middle one wanting) inflated at base with a ciliate superior carina, tapering to a long slender tail-like apex nearly as long as the swollen basal part and clothed with long soft hairs.

The only clue to the identity of this nymph is found in the venation of the developing wings, which are, unfortunately, but poorly preserved. These things are evident. Ante- and post-nodals in the fore wing are 14 and 16 respectively, and

*Dr. Fr. Ris has recently characterized the nymphs of the two commonest European species (Die Süsswasser-fauna Deutschlands, p. 47, 1909) and I distinguished two of the commonest N. American forms in 1903 (Bull. 68 N. Y. State Museum, P. p. 222). This is the fifth species of *Calopteryx* nymphs to be made known.

the latter in the hind wing are of about the same number. There are five or six cross veins behind the stigma, with no brace vein, nor any apparent furcation of vein R1 at its inner end. Quadrangle and sub-quadrangle of the hind wing are without cross veins, and the wing ceases to be petiolate (i. e., the anal vein separates itself from the anal margin) at the third cross vein before the sub-quadrangle.

**Bayadera indica** (Plate V, figs. 4-7.) Hagen, C. R., Soc. Ent. Belg., Vol. 23, p. lxvi, 1880, *"Anisopleura comes?"*

M. C. Z., No. 300, "India, Carleton."

The nymph measures in length 22 mm., abdomen 12 mm., hind femur 5.5 mm., width of head 5.5 mm., of abdomen 4 mm., gills 6 mm.

Body rather stout, moderately depressed. Head widest across the eyes, the hind angles rather large, well rounded, scurfy hairy, and between them there is a strong concavity of the hind margin. Antennae 7-jointed: ratio of length of segments from base outwards is as 1: 1.5 :2.2 :1.5 :1.2 :1 :.7. Frons slightly convex, covered with prickly granulations, its front border, and likewise that of the labium somewhat denticulate. Mandibles obscurely biramous, the outer branch a broad lateral prominence armed externally with four prominent sharp and strong, anteriorly directed teeth. Labium short and broad, the hinge reaching posteriorly to the middle of the prothorax. Lateral borders of the mentum serrate in the middle, the median lobe well rounded, with a narrow, closed median cleft: no raptorial setae: lateral lobes short and narrow, with finely denticulate inner margin that ends in a truncate prominence scarcely forming an end hook, and above which are two sharp incurved hooks on the distal margin, the lower one the larger. Movable hook stout, arcuate.

Prothorax almost as wide as the head, the lateral margins of its dorsal shield spinous. Legs short and thinly hairy. Tarsi 3,-3,-3-jointed, with a minute plantula between the claws. Wing cases extend posteriorly to the apex of the 5th abdominal segment.

Abdomen stout, with conspicuous lateral gills on segments 2-8, one pair on each segment, simple, filiform-conic, constricted at the base, each except the 8th longer than the width of its segment. Segment 10 dorsally excavate behind. Caudal gills three, thick, inflated at base and scarcely triquetral, scantily pubescent, contracted at base, widest before the middle, and suddenly constricted, and tapering in their apical fourth to an acute point.

An examination of fore and hind wing of one specimen re-

vealed the venation poorly preserved in the basal part, but well enough preserved in the outer two-thirds to show the points of origin of sectors, the number of included cell rows, the points of doubling of the rows. I made careful comparison with the wings of adult *Bayadera indica* from the same locality, and found such close likeness in every part as to leave scant doubt as to the species and none at all as to the genus. Ante- and post-nodals in the fore wing were 24 and 21 respectively and the cross veins behind the stigma were, in fore and hind wing, 5 and 6 respectively.

In examining the costal region of the hind wing I noticed that the outer edge of it was thinly clothed with intermingled hairs and flat scales.

At the middle of the inner face of the mandible in this species there is a tooth surrounded in part by thin membrane at its base and perhaps more or less movable, comparable to the articulated appendage to be described in the next species following.

**Unknown nymph from Jamaica** (Pl. IV, figs. 8-12).

A few immature nymphs from Wag-water River, Jamaica, Mar. 7 and 10, '77., M. C. Z., 329 and 322.

Length 15 mm., abdomen 9 mm., gills 5 mm.; width of head 2.5 mm., of abdomen 2 mm.

Body rather stout, somewhat depressed. Head squarish, the hind angles a little less prominent than are the eyes at the midlateral margins. Hind margin concave between the obtuse hind angles. Top of head very flat. Frontal ridge, border of labrum and external lobe of the mandible finely denticulate. Antennae 7-jointed, the segments from base outward being as to length in the following ratio: 1:3:2:1.5:1.2:1:.6. Labium as in *Bayadera*.

Thorax depressed. Legs short, stout, thinly hairy. Wing cases reaching (in these immature specimens) only to the middle of the third abdominal segment.

Abdomen cylindric, or very slightly tapering, the first and tenth segments somewhat shorter than the intermediate segments. No lateral gills: caudal gills three, each cylindric or somewhat inflated in its basal three-fifths, scarcely triquetral, but with a thin marginal fringe of hairs, the apical two-fifths suddenly contracted and then tapering into a long hairy lash-like point.

There is a trapezoidal dark mark across the dorsum of abdominal segments 2-8 or 2-9, narrowly divided on the median line: and there is a row of )-or (- marks, either side, concave externally.

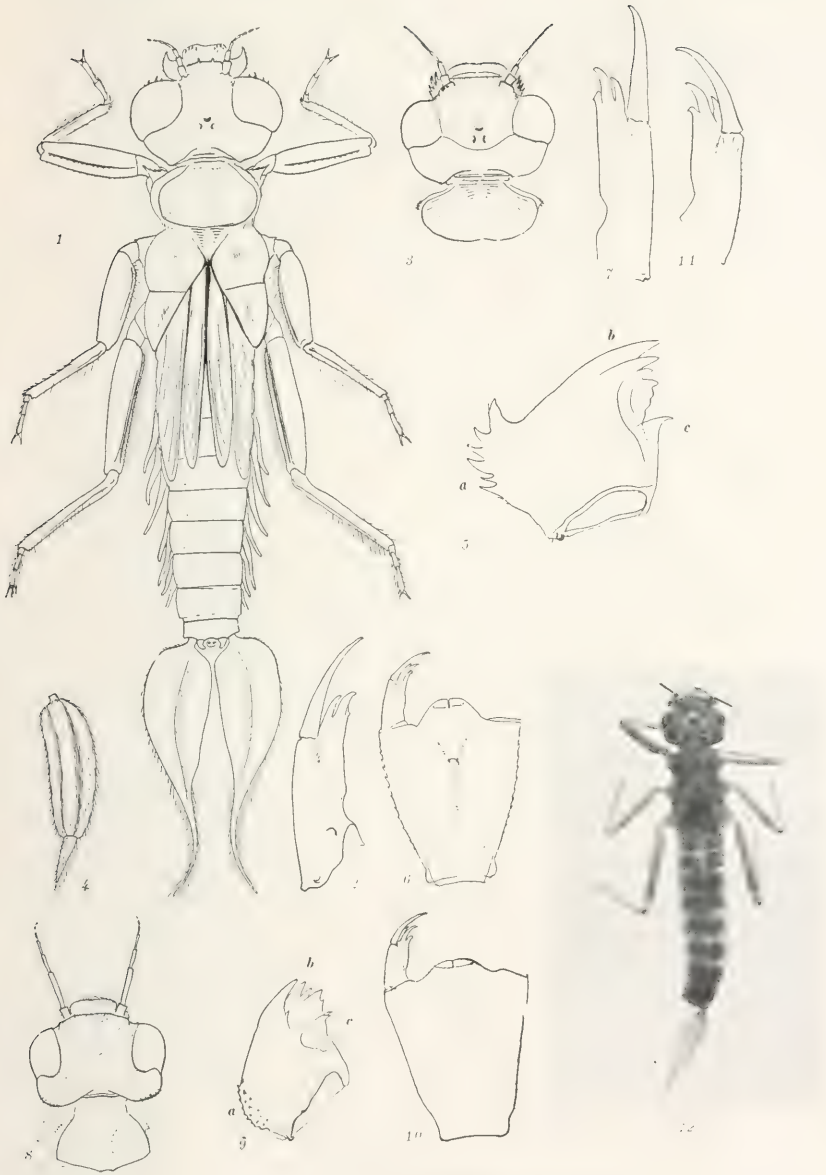
Mandibles short and thick, not biramous, but with a spinous tubercle standing in the place of the outer ramus, and with a bifid palp-like movable tooth upon the middle of the inner face.

This nymph while agreeing in many respects with the two preceding, differs markedly in the absence of lateral abdominal gills and of mandibular tusk; also in the sharpness of the construction of the middle of the caudal gills dividing them as if two-jointed and the greater length of the second antennal segment.

There is no known Jamaican Calopterygine with which this nymph can be associated. The imperfectly preserved venation of one specimen shows that quadrangle and subquadrangle are without cross veins. There are about 15 post-nodals, and there is no brace vein to the stigma. Vein M2 arises a little beyond the nodus, and is closely parallel with the radial sector throughout a rather undulate course. All the long diagonal areas traversing the disc of the wing are occupied by single cell rows, and there is a sudden considerable apical divergence between veins Rs and M3. In all these characters there is considerable resemblance to the Agrionine *Ortholestes,* but I cannot believe that a nymph so unlike all known Lestinae in labium, in gills and in stature is referable to that genus. It accords so well with *Bayadera, Diphlebia,* etc., that I prefer to believe there remains in Wagwater River, Jamaica, an undiscovered Calopterygine genus, with rather sparse venation.

As in the Anisoptera so in the Zygoptera, it is the form of the labium that furnishes the most constant and reliable characters for distinguishing the major groups. The presence or absence of lateral gills is of small moment, and the form of the caudal gills is unpredictable. Plate IV of this paper represents the group which in 1903* I recognized as a sub-family under the name Vestalinae; plate V represents another, that I

*A genealogic study of dragonfly wing venation. Proc. U. S. Nat. Mus., Vol. 26, p. 744.




CALOPTERYGINE NYMPHS—NEEDHAM.

named Epallaginae. Surely the characters contrasted upon these two plates are sufficient to justify the separation of these two groups. Clearly the Epallaginae are the more primitive. Their biramous* mandibles and their lateral abdominal gills ally them with the sub-family Ephemerinae of Mayflies, and their venation is vastly more primitive than that of the Vestalinae.

Since the foregoing was written I have examined a nymph of still another Calopterygine genus from India—a single nymph from Simla Hills collected and sent me by Dr. N. Annandale. It is, unfortunately, a young nymph, perhaps about two-thirds grown (the wing tips reach only to the base of the third abdominal segment), with no venation showing, the specimen being near a moult, its wings crumpled within their sheaths. It is more elongate than *Bayadera* or *Anisopleura* with slenderer legs, and would be larger when grown (length of head and body in the present specimen 18 mm., gills 6 mm. additional.) It may perhaps belong to *Philoganga*. The inflated caudal gills are intermediate in character between those of *Bayadera* and *Anisopleura,* being more pointed than the one and less so than the other and being without constriction at the base of the attenuate apical portion. The mandible is also intermediate in the character of the external ramus, which is not quite simple, but nearly so, with only minute serratures upon its outer side—not a row of subequal teeth. The lateral abdominal gills are very similar in form, but they are decurved beneath the abdomen and scarcely visible from above. They occur, as in the others, on segments 2 to 8.

*The mandible of *Cora* is not biramous in the sense in which I have used the word in this paper: the outer ramus of the forms here described is wanting. The more or less movable piece upon the inner face of the mandible, perhaps a little better developed as a movable part in *Cora* than in any of those I have seen, apparently has no counterpart in the Ephemerine mandible, although there is rather regularly a movable palp-like piece situated at the base of the outer ramus of the mandible on its inner side in Mayfly nymphs.

EXPLANATION OF THE PLATES.

PLATE IV.

Fig. 1.—The head and prothorax of *Neurobasis chinensis?*, from above.
Fig. 2.—End of labium of same, from within.
Fig. 3.—Lateral lobe of the same, from within.
Fig. 4.—End of abdomen, with caudal lamellae, from the side.
Fig. 5.—Head and prothorax of *Calopteryx angustipennis?*, from above.
Fig. 6.—End of labium of same, from within.
Fig. 7.—Lateral lobe of same, from within.
Fig. 8.—End of abdomen with caudal lamellae, from the side.

PLATE V.

Fig. 1.—The nymph of *Anisopleura comes?*, middle gill wanting. The outer ramus of the mandible is exposed at the side of the mouth.
Fig. 2.—Lateral lobe of labium of the same.
Fig. 3.—Head and prothorax of *Bayadera indica?*, from above.
Fig. 4.—Lateral caudal gill of the same.
Fig. 5.—Mandible of same: *a*, external ramus; *b*, internal ramus; *c*, articulate tooth of the inner face.
Fig. 6.—End of labium of same, from within.
Fig. 7.—Lateral lobe of same from within.
Fig. 8.—Head and thorax of nymph from Jamaica, from above.
Fig. 9.—Mandible of same, from above. *a*, *b*, *c*, as in fig. 5.
Fig. 10.—End of labium of same, from within.
Fig. 11.—Lateral lobe of same, from within.
Fig. 12.—An unknown nymph from Jamaica.

## The Stridulations of Some Eastern and Southern Crickets* (Orth.).

BY H. A. ALLARD, U. S. Dept. Agric., Washington, D. C.

In all parts of our country musical species of crickets are more or less common. Although the notes of locusts and katydids are strident lispings and raspings, the stridulations of nearly all crickets are characterized by true musical tones. These insects have become adapted to a wide range of en-

*The crickets mentioned in this paper have been identified through the kindness of Mr. A. N. Caudell of the U. S. National Museum, and all material collected has been added to the U. S. Museum collections in his charge.

vironmental conditions. The mole crickets (*Gryllotalpa*) dwell in subterranean burrows in wet soils. The numerous species of *Nemobius* and *Gryllus* are almost strictly terrestrial in their habits, preferring the grass and dry leaves of fields and pastures. In the low herbs and tangles of vines and shrubs dwell species of *Anaxipha, Phylloscirtus* and *Oecanthus.* In the foliage of the higher shrubs and trees may be found *Orocharis, Cyrtoxipha* and arboreal species of *Oecanthus.*

The notes of all crickets may be classed as either intermittent or prolonged. The intermittent "singers" include all species which chirp or trill briefly, as *Oceanthus niveus, O. angustipennis, Cyrtoxipha columbiana* and many others. The prolonged trillers are always recognized by their uninterrupted trillings which may continue indefinitely without pause. *Oecanthus latipennis, O. nigricornis, Phylloscirtus pulchellus, Anaxipha exigua* and many others have the prolonged trilling habit.

The habits, range and stridulations of many of our crickets are almost entirely unknown. More careful collecting, especially throughout the South, will probably add a number of new species to our fauna and, at the same time, greatly extend the range of many other little known species. Casual collecting in Northern Georgia by the writer has brought to light in this region a number of little known species of locusts and crickets. By his discovery of *Cyrtoxipha columbiana* and *Orchelimum minor* in Northern Georgia the known range of these insects has been extended six or seven hundred miles farther southward. Likewise, the writer's records of *Nemobius ambitiosus* in Northern Georgia extend the range of this interesting cricket about 250 miles northward into the upper piedmont belt.

*Miogryllus saussurii,* Scudd. The writer first met this cricket at Thompson's Mills, Georgia, late in July 1910. It is a ground-dwelling species, and keeps itself well concealed beneath the matted leaves and grass of gardens and orchards. It is very irregular in its distribution at Thompson's Mills and

appears to be more or less solitary in its habits. The writer heard it most frequently in a peach orchard near the settlement and also beneath the soil and leaves in a garden. Its notes are very brief, high-pitched musical trills, tzeee-tzeee-tzeee with brief intermissions. One individual delivered from 38 to 39 trills in a minute. This cricket may be heard in stridulation very early in the morning and more or less throughout the day and at night. It is rather difficult to locate and capture one of these crickets by its notes, for these are quickly silenced by one's approach. It is usually found beneath clods of earth, matted leaves, flat stones and boards. This cricket is very lively, and if uncovered leaps about vigorously. Its light brown coloration makes it very inconspicuous among the similarly colored leaves and soil. This species does not appear to be especially common at Thompson's Mills. It is first heard in midsummer.

*Nemobius ambitiosus,* Scudd. The writer first captured this little cricket at Thompson's Mills, Ga., early in April, 1910, although he had heard its stridulations one or two years before in the same locality. This pretty *Nemobius* is the first species to appear at Thompson's Mills and dwells among leaves in deciduous woods. This cricket is especially common on a warm, heavily wooded slope bordering a small brook just east of the settlement. Its trill is very brief, high-pitched and shrill, tiiiiiiii-tiiiiii-tiiiiiiiii-tiiiiiiii. Late in July the writer also met with small colonies of this cricket in other localities around Thompson's Mills. It is one of the commonest species of *Nemobius* in this vicinity and begins to stridulate as soon as spring opens in March and April. In April 1910 very cold periods of weather with considerable sleet and snow completely silenced these hardy crickets. Notwithstanding this inclement weather these crickets were always in active stridulation as soon as the days became warmer. Rehn and Hebard have said of this *Nemobius* in Southern Georgia: "The sound produced by the males is quite different from that of any other species, but it would be indeed impossible to describe the pitch which makes it so."

The range of this *Nemobius* extends practically all over Florida, since Rehn and Hebard report it from Leon County, Orange County, Duval County, Volusia County, Hillsboro County, Dade County, and other points.* In Georgia it has been found by Hebard and Rehn at Thomasville, southern Georgia, and by the writer at Thompson's Mills, northern Georgia, which is the second record of *Nemobius ambitiosus* in this State.

A very common *Nemobius* around Washington, D. C., in autumn is *Nemobius janus* Kirby. This *Nemobius* is usually found in the grass and leaves of damp soils by the roadside and in fields. In such situations, if flat rocks are present, numbers of the males and females find shelter beneath these. The note of *Nemobius janus* is a weak, low-pitched, prolonged trill, almost indistinguishable from the trill of *Nemobius palustris* of New England, except possibly a little louder. Around Washington this cricket continues to trill until December, if the weather is mild.

*Gryllus pennsylvanicus* var. *abbreviatus* Serville, also occurs around Washington. Not infrequently it takes up its quarters in the house, announcing its presence by its stridulations, which are intermittent chirps, possibly louder than the chirp of *Gryllus pennsylvanicus*.

*Gryllodes sigillatus* Walker. This cricket is exceedingly common at times in the greenhouses of the U. S. Department of Agriculture at Washington, D. C. This cricket is distributed throughout the tropical region of both the Eastern and Western Hemispheres, but has been rather widely introduced into colder regions where artificial tropical conditions are approximated, as in many greenhouses. This cricket is a very persistent singer. Its stridulations are rather shrill, brief chirps, so rapidly delivered as to produce an almost continuous trill. The notes, though louder, recall the notes of a *Nemobius*.

*See the following papers by Rehn and Hebard, both in Proceedings of the Academy of Natural Sciences, Philadelphia. "The Orthoptera of Thomas County, Georgia, and Leon County, Florida," Vol. LVI, 1904. "Orthoptera of Northern Florida," Vol. LIX, 1907.

# Some Remarks on Kirby's Synonymic Catalogue of Orthoptera, Vol. III, with Additional Notes on Vols. I and II.

By A. N. Caudell, of the Bureau of Entom., U. S. Dept. Agric., Washington, D. C.

Having reviewed the first two volumes of this excellent work,[1] I now wish to present some critical notes on the third volume. Most of the notes here made pertain to North American forms. Some miscellaneous notes on volumes I and II, additional to my former review of those two volumes, are appended.

P. 4.—Mr. Kirby has overelooked the fact that *Phyllotettix* Hancock is a synonym of *Choriphyllum* Serville.[2] That this is true, however, there can be no doubt and the species listed under *Phyllotettix* by Kirby should be catalogued under *Zaphyllonotum* Caudell while the genus *Phyllotettix* and its equivalent *Phyllonotus* Hancock should be listed in synonymy under *Choriphyllum* Serville.

P. 48.—*Acrydium abbreviatus* Morse is listed as a synonym of *hancocki*. It is really a variety well worthy of a name. The same is true of *affinis* Hancock and *costatus* Hancock, which are varieties respectively of *crassum* Morse and *arenosum* Burmeister. As a matter of fact but few varieties are listed by Kirby other than as synonyms of the species of which they are really varieties.

P. 50.—*Telmatettix burri* Hancock is here catalogued as a species of *Hedotettix* but the describer of the species has shown it to be a synonym of *Paratettix scaber*.[3]

P. 59—Here Mr. Kirby has entered a *Tettigidea gracilis* Scudder. This seems to be an error as no such species appears to have ever been described, no name *gracilis*, either new or otherwise, appearing at the reference cited by Kirby. Thus

[1] Proc. Ent. Soc. Wash., vol. vii, p. 84-88 (1905); Can. Ent., vol. xl. p. 287-292 (1907).

[2] Caudell, Proc. Ent. Soc. Wash., vol. xi, p. 113 (1909).

[3] Trans. Ent. Soc. Lond., p. 410 (1909).

the name *gracilis* of Bruner is not shown to be preoccupied and the name *exigua,* which is proposed by Kirby, p. 58, to replace it, is unnecessary and falls into synonymy under the name it was proposed to replace.

P. 87.—*Taxiarchus septentrionalis* was described by Bruner, not by Rehn as here listed.

P. 104.—The *Truxalis angusticornis* of Stal is a synonym of *Dichromorpha* viridis. It is correctly listed on page 125.

P. 105.—Prof. Bruner's paper in Proc. U. S. Nat. Museum, Vol. XXX, p. 613-694 was published June 5, 1906, not in February as quoted by Kirby. Thus Bruner's *H. lamellipes* should be listed in synonymy under *Hasinus* Rehn, which was described in May of the same year, giving it precedence by a month over Bruner's species.

P. 107.—The species *enslavae* and *valida* of Rehn are referred to *Syrbula* without question by Rehn and Bruner.

P. 108.—The *Pedioscirtetes pulchella* of Bruner has been referred to the genus *Acrocara* for the last twenty years.

P. 109.—*Acrocara maculipennis* is found in the United States, having been recorded from Arizona by Rehn and Snow. Specimens from that state are in the United States National Museum.

P. 110.—The genus *Gymnes* of Scudder is a synonym of *Bootettix* Bruner as first suggested by Bruner[4] and later definitely established by Caudell.[5]

P. 112.—*Eupedetes* is a synonym of *Eritettix* and *Eupedetes carinatus* Scudder is a synonym of *Eritettix variabilis* Bruner.[6]

P. 115.—The *Stenobothrus subconspersa* of Walker is very likely a synonym of *Amblytropidia occidentalis* Saussure.

P. 118.—*Oeonomus* Scudder is a synonym of *Napaia* McNeill and *Oeonomus altus* is a synonym of *Napaia gracilis* Bruner.[7]

P. 122.—Kirby omits *Orphulella losamatensis* Caudell, Proc.

[4] Biol. Cent.-Amer., Orth., vol. ii, p. 52 (1904).
[5] Proc. U. S. Nat. Mus., vol. xxxiv, p. 73 (1908).
[6] Rehn, Proc. Acad. Nat. Sci. Philad., vol. lix, p. 331 (1907).
[7] Biol. Cent.-Amer., Orth., vol. ii, p. 90 (1904).

Ent. Soc. Wash., Vol. XI, p. 113 (1909), a specific name proposed to replace the *walkeri* of Bruner, 1906 which was shown to be preoccupied by the *O. walkeri* of the same author proposed in 1904. Mr. Kirby erroneously lists this later *walkeri* under the date of 1904 and quotes it, together with the *walkeri* of 1904, in synonymy under *punctata* DeGeer. The later described *walkeri,* that of 1906, has nothing to do with the one of 1904. It is a distinct species for which the name *losamatensis* will have to be used.

P. 125.—*Dichromorpha brunnea* Scudder is a color variety of *Dichromorpha viridis,* not a distinct species as here listed.

P. 127.—*Fenestra* cannot be credited to Brunner as it was used by him in an invalid manner, having no species connected with it.[8] The first writer to validate this genus by referring to it a valid species was Giglio-Tos[9] who referred to it the single new species *bohlsii,* which is therefore the type. The genus *Dichroatettix* of Bruner, based upon the single species *viridifrons,* is a synonym of *Fenestra* Giglio-Tos, its type being synonymous with that of *Fenestra* as pointed out by Rehn.[10]

Mr. Rehn was perfectly correct in replacing the genus *Fenestra* as used by Bruner in 1900 by the new name *Cocytotettix* and this genus should be used for the species listed by Kirby under *Fenestra;* these are *pulchripennis, intermedia,* and *argentina* of Bruner and *linearis* of Rehn.

P. 128.—*Coloradella* was established by Brunner in 1893 but was invalid, having no included species. The next use of the name was by Bruner[11] who questionably referred to it the *Stenobothrus brunneus* of Thomas. This species, being a questionably included one, cannot become a geno type according to commonly accepted usages of nomenclature and thus

[8] Such genera are quite generally considered by entomologists as *nomina nuda.* This is certainly the only satisfactory way of treating such genera.

[9] Zool. Jahrb., vol. viii, p. 807 (1895).

[10] Proc. Acad. Nat. Sci. Philad., p. 31 (1906).

[11] Ann. Rept. Nebr. Board of Agric., 1896, p. 129 (1897).

the genus is yet invalid. Now Mr. Kirby uses the genus and includes one species which he calls *Coloradella brunnea* Bruner, giving as the original reference the place where Bruner questionably referred Thomas' *brunneus* to the genus, apparently considering that Bruner misidentified Thomas' species. But misidentifications should not be perpetuated as distinct names and besides a misidentification on Bruner's part is not evident. Bruner never having described such a species there is no *Coloradella brunnea* Bruner and therefore the generic name *Coloradella* is still invalid.

P. 129.—*Psoloessa buddiana, ferruginea* and *maculipennis* are synonyms of *P. texana.*[12]

P. 130.—*Stirapleura mescalero* Rehn belongs to the genus *Psoloessa* and as a synonym of *texensis.*[13]

P. 134.—*Scyllina calida* Bruner has been recorded from Arizona.[14]

P. 135.—*Ageneotettix arenosus* Hancock is a synonym of *A. scudderi.*[15]

P. 135.—The genus *Aulocara* is, by nearly all essential characters, Oedipodiian as shown by the writer some years ago.[16]

P. 159.—*Gomphocerus clepsydra* and *carpenteri* are synonyms of *clavatus.*

P. 166.—*Staurorhectus glaucipes* Rehn has been removed to the genus *Amblyscapheus* and *A. lineatus* Bruner falls into synonymy under this species, *glaucipes* being the older by a month.[17]

P. 172.—The *Stetheophyma doranii* of Goading has long since been sunk in synonymy under *Chortophaga viridifasciata* DeGeer.

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[12] Rehn & Hebard, Proc. Acad. Nat. Sci. Philad., p. 381 (1908); id, p. 144 (1909).

[13] Rehn & Hebard, Proc. Acad. Nat. Sci. Philad., p. 145, foot-note (1909).

[14] Rehn, Proc. Acad. Nat. Sci., Philad., p. 34, 71 (1907).

[15] Hart, Bull. Ill. State Lab. Nat. Hist., vol. vii, p. 259 (1907).

[16] Caudell, Can. Ent., vol. xxxv, p. 302 (1903).

[17] Rehn, Proc. Acad. Nat. Sci. Philad., p. 167 (1907).

P. 188.—*Chorthippus coloradensis* McNeill is a synonym of *C. curtipennis* Harris.[18]

P. 188.—*Stenobothrus occipitalis* Thomas has long been referred to the genus *Cordillacris* (*Alpha*). It is correctly entered on p. 116.

P. 188.—*Stenobothrus olivaceus* Morse has long been re-referred to the genus *Cordillacris* (=*Alpha*). It is correctly p. 119.

P. 195.—Records of *Arphia fallax* from Florida are probably mistakes, the locality intended probably being Mexico.

P. 196.—*Arphia teporata* is a synonym of *A. arcta.*

P. 198.—*Arphia hesperiphila* Rehn is a *Lactista* and a synonym of *Lactista gibbosa* Saussure.[19] It is correctly entered on p. 236.

P. 198.—The *Oedipoda differentiale* here listed is only a reference under this name by Riley to the common *Melanoplus differentialis.*

P. 204.—*Hippiscus sierra* Rehn belongs to the genus *Xanthippus* if that genus is to be used. In the writer's opinion the characters used for the differentiation of *Sticthippus Cratypedes, Xanthippus* and *Pardolophora,* while useful in separating species, are not of generic value. The retention of these groups as subgenera is not to be encouraged as the tendency is, at least in Orthoptera, to either suppress subgenera or raise them to generic rank.

P. 205.—The generic name *Cratypedes* was first put into print by Scudder[20] but was used in an invalid manner, having included only an undescribed species. The next writer to use the name was Thomas[21] who validated it by describing under it a new species, *C. putnami.* Thus the genus is creditable to Thomas but it is a synonym of *Xanthippus* Saussure and both of these genera, in the reviewer's opinion as stated above, should be sunk under *Hippiscus* Saussure.

[18] Bruner, Biol. Cent.-Amer., Orth., vol. ii, p. 92 (1904).
[19] Bruner, Biol. Cent.-Amer., Orth., vol. ii, p. 168 (1905).
[20] Bull. U. S. Geol. Surv. Terr., vol. ii, p. 267 (1876).
[21] Proc. Davenp. Acad. Nat. Sci., vol. i, p. 257 (1876).

P. 216.—The type of *Chloebora* Saussure is given as species No. 6 while but four species are listed, a good illustration of this unsatisfactory method of type citation. *Ch. grossa* may be taken as the type of *Chloebora.*

P. 234.—The *Oedipoda belfragii* of Stal is best sunk definitely in synonymy under *Spharagemon aequale* as has been done questionably for over a decade. Likewise the *Dissosteira texensis* of Saussure is best disposed of definitely in synonymy under *Spharagemon aequale* as Morse did questionably in 1895.[22] Bruner[23] quotes this species as a probable synonym of *Spharagemon cristatum,* but the original diagnosis does not seem to justify this, the relationship being more clearly with *aequale.*

P. 236.—Mr. Kirby has here, species No. 3, confused two distinct species. The species described by Bruner in 1889 as *Oedipoda* (?) *occidentalis* is a species of *Circotettix* while the *Scirtettica occidentalis* of the same author described four years later is a quite different species and is a true *Scirtettica.*

P. 238.—*Lactista boscanus* Rehn is a synonym of *Tomonotus aztecus* as shown by Bruner[24] and admitted by Rehn.[25]

P. 244.—*Derotmema lentiginosum* Scudder belongs to the genus *Trimerotropis* and is a synonym of *T. gracilis.*[26]

P. 249.—*Oedipoda kiowa* Thomas belongs to the genus *Trachyrhachys,* not to *Trepidulpus* as here listed. The same is true of *Mestobregma pulchella* Bruner.

P. 251.—*Psinidia amplicornis* Caudell is a true *Psinidia.*

*Conozoa melleola* Scudder is a species of *Trepidulus.*

*Agonozoa* McNeill, as shown by Rehn[27] is a synonym of *Trimerotropis* s. s. *Trimerotropis texana* Bruner may be considered as the type of *Agonozoa.*

P. 255.—*Pseudotrimerotropis* Rehn, of which *Trimerotropis*

[22] Psyche, vol. vii, p. 293 (1895).
[23] Biol. Cent.-Amer., Orth., vol. vii, p. 166 (1905).
[24] Biol. Cent.-Amer., Orth., vol. ii, p. 169 (1905).
[25] Proc. Acad. Nat. Sci. Philad., p. 149 (1909).
[26] Caudell, Proc. Ent. Soc. Wash., vol. xi, p. 113 (1909).
[27] Rehn, Trans. Amer. Ent. Soc., vol. xxvii, p. 334 (1901).

*vinculata* Scudder may be taken as type, is based upon characters which are not, in the reviewer's opinion, of generic importance and the genus should be sunk in synonymy under *Trimerotropis*.*

P. 263.—*Hadrotettix mundus* Scudder belongs to the genus *Trimerotropis*.[28]

*Hadrotettix gracilis* Bruner was a nomen nudum until it was validated by Bruner in 1897. It is now referred to the genus *Trimerotropis* where it is preoccupied and is replaced by *Trimerotropis bruneri* McNeill, a name proposed for that purpose.

P. 278.—The *Oedipoda venusta* of Stal has long been located in the genus *Spharagemon*. It is a common Pacific coast species.

P. 341.—Here is another example of the ill working of type citation by number, the type of *Charilaus* Stal being given as No. 4, while but three species are catalogued. *C. carinatus* Stal is the type species.

P. 369.—The use of the emended form *Rhomalea* instead of *Romalea* as originally spelled is not in accordance with the laws bearing upon such matters.

P. 370.—The *Romalea gloveri* here introduced is but a color variety of *Romalea microptera*.

P. 370.—The locality California under *Litoscirtus insularis* should be Lower California.

P. 434.—*Ommatolampis brevipennis* Thomas is a species of *Hesperotettix*. It is correctly entered on p. 499.

P. 461.—*Acridium ambigua* Thomas is a synonym of *Schistocerca americana* Drury.

P. 462.—*Acridium frontalis* Thomas is a synonym of *Hesperotettix speciosus* Scudder. It is correctly entered on p. 500.

[* The name *Pseudotrimerotropis* was proposed to replace the restricted *Trimerotropis* of McNeill, true *Trimerotropis* being equal to his *Agonozoa*. The author of the name has never considered it of more than subgeneric rank. (J. A. G. R.)]

[28] Caudell, Proc. Ent. Soc. Wash., vol. xi, p. 112 (1909).

P. 462.—*Acridium milberti* Serville has long been placed in synonymy under *Melanoplus femoratus* Burmeister.

P. 468.—*Sauracris locusta* is a misspelling for *S. lacerta.*

P. 493.—The *Pezotettix humphreysii* of Thomas is a species of *Melanoplus.*

P. 500.—The type of *Aeoloplus* Scudder is, by original designation, *Caloptenus regalis* Dodge,* not *Caloptenus turnbulli* Thomas as here stated.

P. 507.—Scudder's Revision of the Melanopli in Proc. U. S. Nat. Mus., vol. xx, quoted by Kirby under the various genera of this group as 1898 was really published December 28, 1897, as stated in the list of papers in the completed and bound volume of that publication.

P. 507.—The species *bruneri* Caudell here listed in the genus *Asemoplus* is catalogued wrongly, its proper position being in the genus *Aeoloplus.*

P. 542.—*Pezotettix flavoannulatum* LaMunyon is a synonym of *Dactylotum pictum* Thomas. *Dactylotum picturatum* Bruner is to be used for the purpose for which it was erected, that is to replace the preoccupied *pictum* of Gerstaecker. *Dactylotum longipenne* Townsend is a *Poecilotettix* and a synonym of *P. sanguineus* Scudder and replaces that name, being the older and properly established. The synonymy of these species was first indicated by Bruner,[29] but he used Scudder's name, wrongly considering *longipennis* as a MSS name.

Additional notes on Vol. I.

The genus *Photina* is duplicated, appearing on p. 257 and again on p. 273. The first reference should be eliminated.

The types of *Hestiasula* Saussure, *Harpagomantis* Kirby and *Menexenus* Stal, like all the genera in this catalogue, are indicated by number and, as so often the case, the number quoted as that of the type species is greater than the number of species included. Error is evident.

[29] Biol. Cent.-Amer., Orth., vol. ii, p. 329 (1908).

[* This should be *Aeoloplus regalis* Scudder, not *Caloptenus regalis* Dodge, which Bruner has shown to be a *Melanoplus.* The *regalis* of Scudder has been renamed *bruneri* by Caudell. (J. A. G. R.)]

Additional notes on Vol. II.

The genus *Ephippigera* of Serville seems properly established and should be used in place of *Ephippigerida* Buysson. *Ephippigera* was first proposed by Latreille in 1825 but lacked validity, having no species included in it. Serville validated the name in 1831 by including under it several valid species.

*Orocharis terebrans* Saussure & Zehntner[30] was omitted from the catalogue.

The genus *Platyxyphus* of Walker is properly established, being the raising of Haan's species *platyxyphus* to generic rank. The genus is valid, in spite of Walker's apparent haziness regarding the matter, and the type is *Gryllus platyxyphus* Haan. This genus antedates and replaces the genus *Pteroplistes* of Brunner and the three species listed under that genus should be catalogued under *Platyxyphus,* and *Pteroplistes* sunk in synonymy under that genus.

*Pseudonemobius* Saussure, p. 13 of Kirby, should be used in place of *Paranemobius* as this last name is an error and is corrected in the list of errors in the back of the work in which it is made. Besides the name *Paranemobius* is a *nomen nudum,* occurring only in a table of genera and without citation of described species. *Paranemobius* was, however, given standing by Bolivar in 1900 and thus preoccupies the *Paranemobius* of Alfken described in 1901. Kirby has replaced Alfken's genus by *Caconemobius.*

*Gryllus lineaticeps* Walker, 1869, is preoccupied by *Gryllus lineaticeps* Stal, 1858. Walker's type is apparently lost as it is not marked as present in the British Museum. A new name for it is needed if it is to remain in our lists as a valid species. but, owing to its doubtful status, I think it best to consider it eligible for listing only as an unrecognizable species.

*Pterolepis caucasica* Fischer is listed on p. 180 under the genus *Paradrymadusa* and on p. 199 under the genus *Pholidoptera.* The former is the proper disposition.

The genus *Thliboscelus* of Serville was established with a single included species, the *Locusta camellifolia* of Fabricius.

[30] Biol. Cent.-Amer., Orth., vol. i. p. 277 (1897)

That species is therefore the type of the genus. That Serville misidentified Fabricius' species does not alter this fact according to sound nomenclatural reasoning. Thus *Thliboscelus* falls as a synonym of *Pterophylla* Kirby & Spence, both genera being based upon the same species. The Brazilian insect wrongly considered as the *camellifolia* by Serville without a name as a mere identification is not to be perpetuated as a distinct species, though Kirby, p. 345, has followed Brunner, Monogr. Pseudoph., p. 148, in doing so in this case. I propose the specific name *brasiliensis* for this insect and refer both it and the *Cyrtophyllus crepitans* of Redtenbacher to the genus *Pterophylla,* considering neither generically distinct from the other members of that genus.

## The Male of the Black Scale (Saissetia oleae Bern.) (Hemip.).

By H. J. Quayle, Berkeley, Cal.

While the black scale (*Saissetia oleae* Bern.) is very widely distributed over the world, little has been known and practically nothing published about the male. It was first described by Dr. B. W. Griffith, of Los Angeles, in 1893. It was then said to be limited to a small area in the vicinity of Los Angeles, California. During the past year or two we have taken it at various places in the citrus belt from Santa Barbara to San Diego. It seemed to be especially abundant during the season of 1909. In places where it occurred that year, it was not nearly so abundant in the previous year or the year following. As many as ninety-seven puparia, from all of which males had emerged, have been seen on a single orange leaf. The males have been taken from the leaves of orange, oleander, pepper and olive. They emerged during the months of June, July, August, September, October, November, December, January and possibly other months, though not yet observed.

*The Second Stage Male.* Up to the time of the first moult there is no difference between the sexes. After the first moult

the male becomes decidedly more elongate, resembling more nearly a partly grown soft brown scale. Its length is 1.5 mm. and width .64. It is of a light brown color with the eyes visible in the latter part of the stage as small dark areas on the front margin. The anal plates together form a triangle with rounded corners, and from the tip of each of these there arises three or four small spines, and one large one on the central dorsal surface.

The length of time spent in this stage is about four weeks. During this time it is feeding and grows to about five times the length of the just-hatched larva. At the end of the stage a puparium is formed which completely covers the insect, although it is transparent and not so readily discernible.

*The Male Puparium.* This puparium is a glassy like covering that is formed from the secretion of numerous pores over the body surface of the insect. Its length is 1.5 mm. and width .5 mm. The surface is slightly roughened with a row of granular projections along the dorsal line. Two lines beginning at the anterior end converge upward for a short distance and then run more nearly parallel, with but a slight convergence toward the posterior end. Within this the surface is more convex, forming a ridge along the dorsal line. Not quite ¼ of the distance from the anterior end and at a point where the lines begin to run parallel, is a cross line or carina. Another lateral carina crosses this dorsal strip, or coronet, at ¼ the distance from the posterior end. Immediately posterior to this cross line are two spiracular channels extending to either margin. The other two spiracular channels, extending from the coronet to either side, are just before the middle line. There is a triangular opening for the anal plates and a cleft from this to the posterior end. Along the margin is a series of circular areas from which secretions extend to the surface of the leaf thus holding the puparium in place. When a puparium was removed 3 or 4 weeks after the male had emerged, these connecting threads were still capable of being stretched considerably as was observed upon lifting the puparium.

These are found usually on the under side of the leaves of the orange, pepper, olive and oleander, chiefly, since these constitute the principal foot plants of the scale. When the insect is still beneath it can be detected through this transparent covering. If it has not yet transformed to the propupa it occupies the entire space beneath extending well out to the mar-

gins, but in the case of the later stages the insect beneath is somewhat narrower. These puparia may remain on the leaves for months after the scale has emerged.

The second stage male is capable of moving up to the time the puparium is secreted, which is the preliminary step in the change to the propupa. But it is only rarely that any movement occurs in this stage and hence the males are nearly always found on the leaves where the young first settle.

*The Propupa.* Length 1.4 mm., greatest width .4 mm. Color light brown with red pigment scattered about particularly at posterior end; head reddish; eyes dark red or brown. Sheath of style short and blunt. on either side of the style are two more slender and pointed appendages, the cerci extending beyond the style. At the tip are a few short hairs or spines. The sheaths of the antennae and legs are scarcely visible on the dorsal surface, excepting a broadening, where these lie on the ventral margin. On the ventral side these are plainly visible and lie in close contact with the body.

The length of the propupal period is from 5 to 8 days during the warmer weather.

*The Pupa.* Length 1.2 mm., width .4 mm., general color, same as that of propupa excepting that there is a larger amount of pigment at the anterior end. The head is entirely red. A marked constriction forms the neck, making the head appear as arrow-shaped. Eyes black. The wing pads are conspicuous and extend to 3rd abdominal segment. The style has increased in length so that it is slightly longer than the cerci on either side. The antennae, legs and wing pads, while naturally lying close to the body, are distinct and readily separated from it.

Eight to twelve days are spent in the true pupal stage when it changes to the adult. In all the moults after the second stage the skin is split at the anterior end and pushed back beyond the puparium.

*The Adult Male.*—The fully developed male remains from one to three days beneath the puparium before emerging. The adult stage can be determined without the removal of the puparium by the appearance of the long white caudal filaments which project out beyond the tip of the puparium. The life of the adult male is from one to four days. The following description of the male is copied from the notes of Prof. R. W. Doane, who worked with the writer during the summer of 1910.

Length exclusive of style 1 mm.; style .4 mm.; caudal filament .8 mm.: antennae .5 mm.; wing 1 mm. long, .5 mm. wide; honey yellow; head darker yellow; anterior pair of upper eyes dark red, posterior pair black, smaller; ventral pair black equal in size to the upper anterior pair. Antennae whitish, 10-jointed, first joint short, thick cylindrical; second joint about equal to first but oval; third joint about as long as second but much more slender, slightly swollen toward the tip; remaining joints all slender, cylindrical, fourth as long as fifth and sixth together; others sub-equal in length, collar long, cylindrical; prothorax broad shield shaped; mesothorax more strongly chitinized and wholly brown except a yellow shield-shaped area above, between the bases of the wings; metathorax with a slight brownish tinge, legs brownish yellow; style yellow; caudal filaments white, slender, tapering, twice as long as style; wings hyaline with a yellowish tinge, with a microscopic close-set pubescence.

The above description is given in detail because the original description given by Dr. Griffith is incomplete. The only figures of the male that have appeared from original specimens are given by Marlatt in the U. S. D. A. year book for 1900. "In the figure of the adult there given the black bands are not properly placed. Both are too far forward, the first is not broad enough, the second too broad, and the yellowish spot between the wings does not reach to the base of the wings."—DOANE.

When the males emerge the females that hatched at the same time have completed their second moult and the letter H is evident. Summarizing the length of the life cycle of the male it will be during the summer months as follows: First stage, 1½ months; second stage, 1 month, propupa 8 days, pupa 10 days, adult 3 days. Total, 96 days, or about 3 months.

## The "Crop" of Lepidopters of 1910.

BY R. R. ROWLEY, Louisiana, Missouri.

The early part of the summer of 1910 was anything but encouraging to the collector of lepidopterous insects, barring the greater silk moths. There were no butterflies on the wing and no larvae on the food plants. True, the first sunny days of spring had warmed the chrysalids of *ajax* and *turnus* and a

few swallow tails were in the air and the papaws in full leaf but, alas, the frosts, sleets and snows of the latter half of April stripped the trees of their foliage and froze the larval life almost to extinction.

There was some compensation for these losses in the rather abundant appearance of *cecropia, luna* and *polyphemus,* but, all in all, the prospect was gloomy. Everything had to begin over again after April 25th; the trees to releaf and the hardier larvae to struggle through a starvation period, but the fruit was gone. We measure everything by the crop of fruit out here. Common as *ajax* usually is here all through the summer and as plentiful its eggs and larvae, there was a dearth of its every life stage till August. The even more plentiful *andria* was scarce throughout the entire season.

Not till July was there anything at the electric lights. Then the hawks began to come. The freeze that killed the earlier larval life also killed many of their enemies, for the later broods of caterpillars appeared in unusual numbers and fairly healthy, except the *Sphinx* larvae.

In August and September larvae were to be found everywhere. *Luna* and *regalis* on all their food plants, *imperialis* even more plentiful still, for all the shade trees yielded them and the sassafrases. *Cecropia* was not so much in evidence, but *polyphemus* was abundant. Then, too, in August and throughout September the great *Papilios* hovered over their food plants or settled in great bunches about the wet, sandy pool margins or the muddy roadside. From one small butternut tree, scarcely eight inches in diameter, thirteen larvae of *C. regalis* were taken, eight of them well grown, three on a small persimmon tree and others on sumach.

It was on an east hillside in an old abandoned field where the three of us, Harold Davenport, Virgil Smith and the author, spent a Saturday in September and came back laden with spoils. It was the 24th and a splendid day, and we had decided to make a picnic of it, but we forgot the lunch till it was time to quit the woods. The persimmon trees, the sassa-

fras bushes and the sumach, the hickories and the buck bushes were too alluring. We filled all our cans, boxes and paper bags with larvae. The hickories gave us *luna, juglandis* and *excaecatus*; the persimmons, *regalis* and *luna,* and the sassafras, *imperialis, troilus* and *crispata.* The buck bushes were alive with the larvae of *diffinis.*

The yield was four "hickory horned devils," four gigantic *imperialis,* eighteen *lunae,* two *juglandis,* one *excaecatus,* thirty *troilus,* fifty *diffinis,* five *Lagoa crispata,* and numbers of other "worms."

Elated with our success we spent the next day in the woods, but our selection of locality was unfortunate and we did poorly. We still found the larvae of *troilus, diffinis* and *luna* abundant, but the larger caterpillars were nearly wanting. We took two *imperialis* and eight *juglandis,* but we wandered over much territory. We were not herpetologizing, but we killed two gigantic copperheads on the hillside and the next day an equally gigantic spreadhead.

Throughout the days of late August we collected *regalis* larvae, and all through September, even to the 10th of October, we gathered up *imperialis* "worms."

Of the hawk moths the most abundant were *modesta, diffinis, excaecatus* and *geminatus. Hylaeus* was not so abundant as usual, *pandorus* and *myron* larvae badly parasitized. At light, *drupiferarum, carolina, celeus, pandorus* and one *myops,* a rare moth here. Out of twelve eggs and twenty larvae of *Cressonia juglandis* collected during the summer, three moths and three chrysalids were obtained.

These larvae suffer terribly from the microgasters, and it is no wonder the species is so rare. Even in the absence of parasites, the larvae of *juglandis* seem delicate, for the author collected a number of fertile ova and freshly hatched caterpillars in early August, and every "worm" of them died before the third moult.

Of the few *geminatus* larvae picked up in September, all. save two, "broke out with parasitic cocoons" and the two later died, one even after pupation.

One day while hunting regal larvae the writer, much to his great delight, found two caterpillars of *Sphinx kalmiae* feeding in a low ash bush. One of them was attempting to cast his skin in the last moult but he was too weak and died. The other was later riddled by microgaster larvae.

A few larvae each of *Daremma undulosa* and *Ceratomia amyntor* succumbed to their internal enemies. It seems such a shame that the great caterpillars of our most beautiful moths should suffer so from foes so insignificant. This law of balance in nature probably means much to life in general and certainly to the vegetable world, but it is hard to convince the collector of larvae that his losses are payments to nature of any apparent indebtedness. That the delight which one experiences on finding some treasure of a larva should be turned to bitter disappointment in the claiming of this same treasure by some parasitic enemy is not much calculated to win an ardent admirer of this same so-called eternal fitness of things.

The author brought to pupation a fine colony of *Sphinx eremitus* larvae from eggs collected by Miss Lulu Berry, of Vinton, Iowa, feeding them through on common peppermint, although the eggs were found on the leaves of bugle weed. There was practically no loss in these larvae.

From eggs furnished by the same collector and found on the leaves of Enchanter's nightshade, the writer fed the larvae of *Amphion nessus* on wild grape and secured seven pupae.

A full grown larva of *Smerinthus excaecatus* was picked up under a maple tree on November 3d, after a number of frosts and several severe freezes. It fed on the yellowed leaves of soft maple, poplar and apple till November 29th, when it ceased eating and died. Of course, it was kept in a jar in the house by a fire.

The disappointment in the searches for *Papilio* larvae in the early part of summer was more than balanced by the abundant finds in August and September.

Harold Davenport handled more than two hundred eggs and larvae of *ajax* and obtained a goodly number of chrysalids

while Virgil Smith, Verner Pinkerton and the author collected a goodly number of *cresphontes* larvae.

Larvae of *turnus* were found on hop tree, prickly ash, plum, apple and ash, but not plentifully. No searches were made for *asterias* though the imagoes were not rare. As usual, from the scarcity of its food plant, *philenor,* even in the winged state was very scarce.

While feeding three larvae of *regalis* in a roomy breeding cage and with an overabundance of fresh leaves, the smallest caterpillar mysteriously disappeared nor could any trace of it be found. The cage was close and no possible show of escape, so the only conclusion as to its fate was that the larger two worms devoured it. Repeatedly has the author lost *Catocala* larvae in the same mysterious manner and Mr. Davenport reported similar losses among well grown larvae of several genera and species. Why caterpillars with an abundance of food should resort to cannibalism is inconceivable, and yet there is no other way to explain the disappearance of some of our "worms."

From over one hundred pupae of the first brood of *Triptogon modesta* (Rothschild and Jordan call this *Pachysphinx modesta*) quite seventy produced imagoes with crippled wings, although all chrysalids were on damp earth and strips of cloth hung down the sides of the cages. The freshly hatched imagoes all climbed up the cloth and yet with everything in their favor, they failed to mature. Thinking the trouble was caused by keeping the pupae together in the cages, they were separated so that one would emerge in a can or jar per night and still there was little improvement in the quality of the moths.

It is true there was a slight increase in the number of perfect moths after the separation of the chrysalids, but the trouble was not obviated. As a matter of fact there were a few more deformed females than males. Out of ten moths that emerged together, one night, there were but two perfect specimens. It is possible that this is another means that nature takes to check overproduction.

Out of two lots of eggs of the second brood of *modesta* (nearly two hundred eggs in all) but three chrysalids were secured, the larvae dying before the third moult. However, one lot of these eggs was from a female that mated with a male from the same parents.

Of the first brood, mentioned above, about a fifth failed to give imagoes with the rest and are holding over till next spring. Three imagoes that appeared fully a month after the rest, were very pale in color, while the first moth that emerged had an unusually red hind wing, in fact the wing was red all over.

From a half drowned female *Smerinthus excaecatus* found floating on a tub of water after an all night's rain, one hundred and five eggs were obtained and from the larvae fed on apple, about fifty chrysalids secured. The losses were largely when the larvae were small. This is one of the hatches of larvae where cannibalism was apparent.

By far the most interesting larvae of the summer's work were the *Sphinx eremitus* "worms," so hardy and so grotesque with their dorsal hump and the black dorsal spot.

It is often asked if *Catocala* moths ever come to light like most other moths. It is generally denied that they do and yet twice this summer in early July the writer saw a *Catocala* on an electric light pole in the full glare of the light but too high to be reached. It is almost certain that the species was *ilia*.

Now that the summer is gone and the trees are stripped of their leaves, cocoon hunting is no mean sport but probably more interesting still is the search for *Catocala* eggs. A few boxes and a small chisel are the necessary paraphernalia and the loose outer bark and the cracks in the bark of hickory, walnut, white and bur oak, honey locust, willow, maple, plum and crab, are carefully searched for the small ova.

In our searches for cocoons on the shade maples we had to use long fishing poles with end hooks, and the fall on the pebbles of some of the *polyphemi* proved disastrous. Little or no trouble was experienced in collecting the *prometheae* as most of them were found dangling from the twigs of low

sassafras and persimmon bushes. Frank Caldwell reported eight cocoons of *promethea* from one sassafras, while the author took seven from a small bush. The remarkable likeness among the cocoons of *promethea, cynthia* and the gigantic *atlas* is rather surprising inasmuch as all three belong to different genera. The caterpillar of each of these moths spins an elongate cocoon inside a single leaf securely fastened to the twig or compound leaf stalk by silk and left to dangle in the breeze.

One *polyphemus* cocoon was found on a sassafras bush and one on willow, but the latter just under a small birch tree which yielded another. The author in the course of three or four hours collected ninety-nine *promethea* cocoons from sassafras bushes along a small stream valley that had its source in a cultivated field. Down where the stream flowed through a pasture not one cocoon was found, although there was an abundance of the food plants. Near towns cocoons of this moth are always rare here in Missouri, and the author has the first one yet to find in the city limits of Louisiana, although he has often searched for them on persimmon trees. Still, a number of years ago, he found them not uncommon on the shade persimmons inside the city limits of Fort Smith, Arkansas.

This year *cecropia* cocoons seem scarce and most of our finds have been on soft maple and willow, Lowell Pinkerton securing the greatest number.

While most of our large moths are more or less general feeders in the caterpillar stage, we expect to find them more abundant on special plants, *promethea* on sassafras, *cecropia* on plum, *polyphemus* on maple, *luna* on walnut, *imperialis* on maple and *regalis* on walnut, and yet all of these except *polyphemus* and *imperialis* may be found on persimmon. The author has even found the larva of *cecropia* feeding on fever wort, and once fed one through on walnut, securing therefrom the darkest moth he ever bred. The larva of *io* will feed on almost any leguminous plant, having been found on garden bean vines. It does well on *Amorpha*.

I am again under obligations to Miss Margaret Haley for the careful typing of this article.

# ENTOMOLOGICAL NEWS.

[The Conductors of ENTOMOLOGICAL NEWS solicit and will thankfully receive items of news likely to interest its readers from any source. The author's name will be given in each case, for the information of cataloguers and bibliographers.]

TO CONTRIBUTORS.—All contributions will be considered and passed upon at our earliest convenience, and, as far as may be, will be published according to date of reception. ENTOMOLOGICAL NEWS has reached a circulation, both in numbers and circumference, as to make it necessary to put "copy" into the hands of the printer, for each number, four weeks before date of issue. This should be remembered in sending special or important matter for a certain issue. Twenty-five "extras," without change in form and without covers, will be given free, when they are wanted; if more than twenty-five copies are desired, this should be stated on the MS. The receipt of all papers will be acknowledged. Proof will be sent to authors for correction only when specially requested.—Ed.

PHILADELPHIA, PA., APRIL, 1911.

## THE PERIODICAL CICADA IN 1911.

Circular No. 132 of the Bureau of Entomology, U. S. Dept. of Agriculture, by Mr. C. L. Marlatt, Assistant Chief of the Bureau, dated February 13, 1911, calls attention to the Periodical Cicada of the present year. Two important broods of this insect, misnamed "locust," will appear. "One of these belongs to the 17-year race and extends from New York southward into North Carolina, in general lying east of the Allegheny Mountains." Technically it is known as Brood II and, although occurring in part of the same territory, must not be confused with the great brood—X— of the years 1902 and 1919. Brood II seems not to have appeared in any locality in sufficient abundance to receive a star (*) in Mr. Marlatt's records,† the device employed to indicate places (counties) where "the cicada occurred in one or more dense swarms." Observations made by Mr. H. H. Brehme, in Cape May County, New Jersey, in November, 1910, and published in the NEWS for March, 1911, page 142, hold out the possibility of such a dense swarm next summer.

The other brood due in 1911 is XXIII "of the southern, or 13-year race, and covers the lower half of the Mississippi Val-

†See especially Bulletin No. 71 of the Bureau, 1907.

ley....this is one of the largest of the 13-year broods, dividing this honor with Brood XIX" of 1907 and 1920.

On account of the overlapping of broods of the 17-year and 13-year races in different parts of the country, some uncertainty exists as to whether certain records of previous years are properly credited to the two broods due this year. Mr. Marlatt therefore calls especially for observers in North and South Carolina, in northern Missouri, southern Illinois and Indiana to note particularly the occurrence or non-occurrence of this insect this year. Records and specimens should be forwarded to the Bureau at Washington or to competent local entomologists and then published.

As to the protection of nurseries and young orchards from the cicadas, the most reliable means "is by collecting the insects in bags or umbrellas from the trees in early morning or late evening, when they are somewhat torpid. Such collections should be undertaken at the first appearance of the cicada and repeated each day." It would seem possible to use poultry to a large extent to destroy the insects on their emergence from the soil.

*Note.*—"1908" in line 13, page 4, of this Circular is an evident error for "1898."

## Notes and News.

### ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

Messrs. R. E. Snodgrass (whose excellent monograph on the Anatomy of the Honey Bee appeared in Technical Series No. 18, of the Bureau of Entomology, U. S. Dept. of Agriculture, of last May) and B. N. Gates have resigned their positions with the Bureau.

LISTRONOTUS BAGOIFORMIS Champ. in Utah.—Amongst some Curculionide sent me some ago by Mr. H. F. Wickham I have found a specimen of this species from Provo, Utah. It was described and figured by me in the "Biologia" (Col. iv, 4, p. 120, pl. 8, fig. 1), in December, 1902, and has perhaps not yet been recorded from north of the Mexican frontier. The types were found near the City of Mexico. The insect is closely related to *L. latiusculus*, Boh.—G. C. CHAMPION, Horsell, Woking, England. January, 1911.

The work announced for the Lake Laboratory of the Ohio State University for the coming Summer includes a course in Entomology and the opportunity to carry on research work in problems upon insect life. The entomological work will be in charge of Professor Osborn, Invertebrate Zoology under Professor Brookover and Ecology under Professor Jennings, all including matter which is of distinct interest to entomologists. The session opens June 19, and additional information as to particular courses or the general announcement may be obtained upon application to the Director.—Herbert Osborn, Ohio State University, Columbus, Ohio.

A three-volume Festschrift to Professor Richard Hertwig, of the University of Munich, in commemoratiom of his sixtieth birthday (Sept. 23, 1910) has appeared (Fischer, Jena). Of entomological interest among its contents are: Minchin, E. A. On some parasites observed in the rat flea (*Ceratophyllus fasciatus*). Schtschelkanowzew, J. P. Der Bau der männlichen Geschlechtsorgane von *Chelifer* und *Chernes*. Zur Kenntniss der Chelonethi im System. Sasaki, C. Life History of *Schlechtendalia chinensis* Jacob Bell (a gall-producing insect). Schwangart Ueber die Traubenwickler (*Conchylis ambiguella* Hübn, und *Polychrosis botrana* Schiff) und ihre Bekämpfung, mit Berücksichtigung natürlicher Bekämpfungsfaktoren.

Under the will of the late Baron Edmond de Selys Longchamps, his sons have been publishing a *Catalogue Systematique et Descriptif des Collections Zoologiques du Baron Edm. de Selys Longchamps* in quarto form with colored plates and half-tone text figures. The following entomological parts have appeared: Fascicules VI. Trichoptera, pts. 1 and 2, G. Ulmer (Hamburg); XVII Cordulines and XVIII-XX Aeschnines, R. Martin (Paris); V, 1st part, Megaloptera and VIII Ascalaphidae, H. W. van der Weele (The Hague); IX-XI Libellulines, F. Ris (Rheinau). In manuscript ready for printing are Fascicules II Orthoptera, M. Burr (Eastry, Kent); III Psocidae, G. Enderlein (Stettin), and Termitidae, J. Desneaux (Brussels); XII-XVI Libellulines, F. Ris; XXIV-XXV Calopterygines, R. Martin. In preparation are Fascicules IV Ephemeridae and Perlidae, F. Klapalek (Prague); V, pts. 2 and 3 Mecoptera, Planipennia and VII Myrmeleonidae, H. W. van der Weele; XXVI. pt. 1, Agrionines, F. Förster (Bretten, Baden). Each group is treated monographically and its consideration is not limited, in most cases, to the material in the Selys collections.

The elder son of Baron Edmond de Selys, Baron M. F. Raphael de Selys Longchamps, died at the family chateau of Longchamps at Waremme, Belgium, January 11, 1911, in his seventieth year.

VOLUME 22 of the Journal of Morphology (Wistar Institute of Anatomy and Biology, Philadelphia), originally intended as a testimonial by former students and colleagues to the founder of the Journal, Professor Charles Otis Whitman, will, in consequence of his untimely death, become a Memorial Volume to him. The following entomological papers are announced as to be among its contents: Moenkhaus, W. J. The influence of inbreeding and selection on the fertility and sex ratio in *Drosophila*. Montgomery, T. H. The spermatogenesis of the Hemipteron *Euschistus*. Morgan, T. H. Further studies of ovogenesis and spermatogenesis in Phylloxerans and Aphids. Wheeler, W. M. The ant colony as an organism. Wilson, E. B. A review of the chromosomes of *Nezara* with some more general considerations.

PROFESSOR J. M. ALDRICH, Moscow, Idaho, has received a grant from the Elizabeth Thompson Fund "to investigate the fauna of the waters and shores of western salt and alkaline lakes," and will spend a portion of next summer in a field trip, commencing his studies at Great Salt Lake and extending them westward at least as far as Mono Lake, Cal. The investigation will include all orders of insects as far as they exhibit adaptation to a salt or alkaline environment; the problems of greatest interest, perhaps, are those pertaining to several partially-known species of Ephydra, the larvae of which breed in salt and alkaline lakes. Professor Aldrich plans to visit all the lakes from which material of this kind has been reported, four or five in number, and any other lakes of like character along his route. He will be glad to receive suggestions from any entomologists who have made observations on the subject in view, or who may wish to have attention given to any collateral entomological problem in the interesting field to be visited.

CATOCALA BEUTENMULLERI AND C. WERNERI.—At the meeting of the Newark Entomological Society of Oct. 9th, 1910, as recorded in the Ent. News, March, 1911, p. 140, Mr. Beutenmüller is credited with the statement that *Catocala beutenmülleri* B. & McD. is the male of *C. warneri* Poling. I presume the species Mr. Beutenmüller had in mind was *C. werneri* Bied. (Ent. News XX, 76, '09). At the time of description both ♂ and ♀ of *C. beutenmülleri* were before the writer and also the unique type of *C. werneri*, which is contained in Coll. Barnes. While both belong to the *verilliana* group, the two species are totally unlike in the appearance of the primaries; *C. werneri* is largely suffused with dark brown blotches, whereas *C. beutenmülleri* in *both sexes* is a clear bluish gray, without traces of brown patches. Their distinctness is without question.—J. MCDUNNOUGH, Decatur, Illinois.

The Study of Disease-Transmitting Insects.—With a view to furthering the work of the African Entomological Research Committee, Mr. Andrew Carnegie has been good enough to place at its disposal a sum of £1,000 a year for three years to defray the cost of sending a few suitably qualified young men to the United States to study the practical applications of entomology which have received so much attention in that country. Three of these Carnegie Scholars, as they are to be called, have been selected, and two of them are already at work in the States. The fact that Dr. L. O. Howard, Chief of the Bureau of Entomology at Washington, is personally interesting himself in the matter is a sufficient guarantee that all possible facilities will be given to the scholars, and it may be confidently expected that the scheme will be of great value to British administration in Africa and elsewhere by providing a body of well-trained entomologists available for employment in the services of the different Colonial Governments.

It may be mentioned that the Research Committee was appointed in June, 1909, by Lord Crewe, the then Secretary of State for the Colonies, with the object of promoting the study of the insects which play so prominent a part in the spread of disease among men, animals, and plants in Africa; that Lord Cromer is its President; and that it includes some of the most eminent authorities on entomology and tropical medicine in this country.

During the short period of the Committee's existence satisfactory progress has been made. The scheme has been energetically taken up by the African Colonies and Protectorates, and the large quantity of material already received at the Committee's Office in the Natural History Museum at South Kensington has very materially increased our knowledge of the insect pests of Africa. The collections of insects, after being properly identified and recorded, are being distributed to the Schools of Tropical Medicine, Universities, Museums, or other institutions where they are likely to be of value for the purpose of teaching or scientific study. Two skilled entomologists are being employed under the direction of the Committee in East and West Africa respectively, for the purpose of interesting and instructing the local officials in the work, and also of carrying out special investigations.

The Committee has issued quarterly a scientific journal, entitled the "Bulletin of Entomological Research," of which the first volume is just completed. It contains many important articles by well-known authorities, and is obtaining a wide circulation. Further particulars may be obtained from the Secretary of the Committee—Mr. Guy Marshall, British Museum (Natural History); South Kensington, London.

Colonial Office,
23rd February, 1911.

A New Work on Galls.—The E. Schweizerbartsche Verlagsbuchhandlung (Nägele & Dr. Sproesser), of Stuttgart, announce the undertaking of a pretentious work on galls: Die Zoocecidien, durch Tiere erzeugte Pflanzengallen Deutschlands und ihre Bewohner, by Ew. H. Rübsaamen, with the collaboration of Messrs. Thomas, Nalepa, Küster, von Schlechtendal, Dittrich, Börner, Grünberg, Mees, Schmiedeknecht, Kolbe, Ritzema-Bos and others. The chief value of the work is to lie in 150 plates of large quarto size, for the most part in 13-15 colors, by Werner & Winter, of Frankfurt-on-the-Main, from Rübsaamen's drawings. The text will amount to about 150 sheets (Bogen), and will include text-figures. The undertaking has the financial support of the German Imperial Ministry of the Interior. The first part is announced and the whole is to be finished in 1917.

Corrections in Diptera of the New Jersey List of Insects, 1909.—I have noted the following minor corrections in the list of the order Diptera contained in Report on the Insects of New Jersey, 1909, by Dr. Jno. B. Smith.

Page 740, third line from bottom of page, read *Therioplectes* for *"Therioplectus."*

Page 745, genus *Spogostylum,* fourth species, read *limatulus* for *"limatula."*

Page 752, genus *Laphria,* third species, read *aeatus* for *"areatus."*

Page 753, figure 312, *"Asilus missouriensis."* This name is a synonym of *Proctacanthus milberti* and the figure, which is an old one, does not delineate either the habitus or generic characters of the genus *Asilus* as at present defined. Dr. Smith expresses the wish that the illustration may be eliminated from the literature, to which we say, Amen!

Page 755, third genus read *Campsicnemus* for *"Campicnemus."*

Page 755, seventh genus, read *Nematoproctus* for *"Nematoprotus."*

Page 812, genus *Agromyza,* sixth species, *"dimidiatus"* Walk. I can find no record of any such American species of either *Agromyza* or the old genus *Phytonomus* in Walker's lists or any of the other dipterological catalogs of more recent date. This species is evidently *diminuta* Walker which is known to mine the leaves of cabbage.

In Bulletin No. 10, new series, Division of Entomology, U. S. Dept. of Agriculture, Mr. D. W. Coquillett records the larvae of this species mining the leaves of potato in Missouri, leaves of white clover in Washington, D. C., and leaves of cabbage in California. It was also bred from a stem of cabbage at Ames, Iowa, by Mr. H. Osborn. In Aldrichs' "List of Diptera" *Agromyza diminuta* is recorded as a synonym of *A trifolii* Burgess on the authority of Mr. Coquillett who now recognizes it as a valid species.—W. R. Walton, Bureau of Entomology, U. S. Dept. of Agriculture, Washington, D. C.*

* Published by permission of the Chief of the Bureau.

# Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), excluding Arachnida and Myriapoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published, and are all dated the current year unless otherwise noted. This (*) following a record, denotes that the paper in question contains description of a new North American form.

For record of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington.

**4**—The Canadian Entomologist. **7**—U. S. Department of Agriculture, Bureau of Entomology. **8**—The Entomologist's Monthly Magazine, London. **11**—Annals and Magazine of Natural History, London. **22**—Zoologischer Anzeiger, Leipzig. **35**—Annales, Societe Entomologique de Belgique. **38**—Wiener Entomologische Zeitung. **40**—Societas Entomologica, Zurich. **45**—Deutsche Entomologische Zeitschrift. **90**—Revue Scientifique, Paris. **92**—Zeitschrift fur wissenschaftliche Insektenbiologie. **99**—Cornell University Agricultural Experiment Station, Ithaca. **104**—Mittheilungen, Naturhistorisches Museum in Hamburg. **159**—Bollettino, Laboratoria di zoologia generale e agararia della R. S. Superiore d' Agricoltura in Portici. **179**—Journal of Economic Entomology. **189**—Pomona Journal of Entomology, Claremont, Cala. **191**—Natur, Munchen. **194**—Genera Insectorum, Dirigés par P. Wytsman, Bruxelles. **216**—Entomologische Zeitschrift, Stuttgart. **251**—Annales, Sciences Naturelles, Zoologie, Paris. **305**—Deutsche Entomologische National-Bibliothek, Berlin. **314**—Atti del R. Istituto d'Incoraggiamento di Napoli. **315**—Memoires, Academie Royale de Belgique, Classe des Sciences, 2d ser., Brussels. **316**—Canada Department of Mines, Geological Survey Branch, Ottawa.

**GENERAL SUBJECT. Fernald, Osborn, Bruner, etc.**—Present methods of teaching entomology, **179**, iv, 63-90. **Handlirsch, A.**—Canadian fossil insects, 5. Insects from the Tertiary lake deposits of the southern interior of Br. Columbia collected by Lawrence M. Lambe in 1906, **316**, Mem. 12-P, 93-129 (*). **Meissner, O.**—Kurze Bemerkungen ueber einige neuere naturwissenchaftliche Theorien, **40**, xxv, 87-88. **Pierantoni, U.**—Sulla utilizzazione dei ragni quali predatori d'insectti nocivi in agricoltura, **314**, lxi, 317-321. **Plateau, F.**—Recherches experimentales sur les fleurs entomophiles peu visitees par les insectes, rendus attractives au moyen de liquides sucres odorants, **315**, ii, fasc. 7, 55 pp.

**APTERA AND NEUROPTERA. A. L.**—L'Industrie des Termites, **90,** xlix, 150-151. **Crawford, D. L.**—American Psyllidae III (Triozinae), **189,** iii, 422-453 (*). **Holmgren, N.**—Versuch einer Monographie der amerikanischen Eutermes-Arten, **104,** xxvii, 171-325 (*). **Ulmer, G.**—Einige sudamerikanische Trichopteren, **35,** lv, 15-26.

**ORTHOPTERA. Shelford, R.**—Fam. Blattidae, Subfam Blattinae (= Periplanetinae), **194,** 109 fasc., 27 pp.

**HEMIPTERA. Bergoth, E.**—On some controversial items concerning a few Hemiptera, **35,** lv, 28-29. **Butler, E. A.**—A contribution towards the life-history of Miris laevigatus, **8,** xxii, 36-40. **Crosby, C. R.**—The apple red bugs (Heterocordylus malinus and Lygidea mendax), **99,** Bull. No. 291, 213-225. **Davidson, W. M.**—Notes on some Aphididae taken in Placer County, Cal., **189,** iii, 398-399. **Enslin, E.**—Gargara genistae und Formica cinerea, **92,** vii, 19-21. **Essig, E. O.**—Aphididae of So. California V, **189,** iii, 400-403. Notes on Coccidae VI, **189,** iii, 404-411. **Marlatt, C. L.**—The periodical cicada in 1911, **7,** Circ. No. 132, 5 pp. **Wilson, H. F.**—Two new genera and seven n. sp. of the family Aphididae, **4,** xliii, 59-65 (*).

**LEPIDOPTERA. Bird, H.**—New histories and species in Papaipema and Hydroecia, **4,** xliii, 37-47 (*). **Comstock, W. P.**—Thecla chrysalus, and its variety citima, **4,** xliii, 65-66. **Coolidge, K. R.**—Melitaea theona Menetries and its synonymy, **4,** xliii, 50-52. **Fischer, E.**—Ei, Raupe und Puppe von Argynnis pandora, **40,** xxv, 79-80. **Gerwein, E.**—Kopula von Taeniocampa stabilis male and gothica female, **92,** vii, 27. **Ihering, H. V.**—Ueber sudbrasilianische Schadlinge der Feige, **305,** ii, 20-21. **Leigh, H. S.**—A biological inquiry into the nature of Melanism in Amphidasys betularia, **216,** xxiv, 240. **Linstow, V.**—Der morphologische Geschlechtsdimorphismus der Schmetterlingsflugel und seine Bedeutung, **45,** 1910, 45-53. **Meyrick, E.**—Heterocera (Pyrales) Fam. Orneodidae, **194,** 108 fasc., 4 pp. **Schaus, W.**—New species of Heterocera from Costa Rica, V, **11,** vii, 173-193 (*). **Stichel, H.**—Rhopalocera, Fam. Riodinidae. Allgemeines-Subfam. Riodininae, Teil 1, **194,** 112a fasc., 238 pp. **Unzicker, Dr.**—Citheronia regalis und ihre Zucht, Ein Beitrag nach Studien in ihrer Heimat, **92,** vii, 21-23.

**DIPTERA. Bezzi, M.**—Un nuovo genere di Asilidi **159,** iv, 174-179 (*). **Coquillett, W. B.**—A decision on Meigen's 1800 paper, **4,** xliii, 66. **Kieffer, J. J.**—Description de quelques Dipteres exotiques. (Sciara), **159,** iv, 327-328 (*). **Martelli, G.**—Alcune note intorno ai costumi ed ai danni della Mosca delle Arance (Ceratitis capitata), **159,** iv, 120-127. Notizie sulla Drosophila ampelophila, **159,** iv, 162-174. **Rothschild, N. C.**—Liste des Siphonaptera du Museum

d'Histoire Naturelle .de Paris, accompagnee des descriptions des especes nouvelles, **251,** xii, 203-216. **Sanders, G. E.**—Notes on the breeding of Tropidorpria conica, **4,** xliii, 48-50. **Summers, S. L. M.**—Entomological notes from the London School of tropical medicine.—No. 1, Description of a n. sp. of Tabanidae from Br. Guiana, **11,** vii, 213-215.

**COLEOPTERA. Anon.**—Das Gehirn eines Kafers, **191,** 1911, 143. **Blunck, H.**—Zur kenntnis der Natur und Herkunft des "milchigen secrets" am Prothorax des Dytiscus marginalis, **22,** xxxvii, 112-113. **Bowditch, F. C.**—Notes on Diabrotica and descriptions of n. sp. (cont.), **4,** xliii, 53-58. **Essig, E. O.**—The natural enemies of the citrus mealy bug, III, **189,** iii, 390-397. **Hagedorn, M.**—Fam. Ipidae, **194,** 111 fasc., 178 pp. **Kissel, F.**—Bie Kissel'sche Russelkafer Falle, **92,** vii, 23-25. **Raffray, A.**—Coleopterorum catalogus. Pars 27: Pselaphidae, 222 pp. **Schmidt, A.**—Lamellicornia, Fam. Aphodiidae, **194,** 110 fasc., 155 pp. **Schubert, K.**—Neue exotische Staphyliniden, **45,** 1910, 1-39. **Silvestri, F.**—Metamorfosi del Cybocephalus rufifrons, e notizie sui suoi costumi, **159,** iv, 220-227. Contribuzioni alla conoscenza degli insetti dannosi e dei lori simbionti 1. Galerucella dell' olmo (Galerucella luteola), **159,** iv, 246-289.

**HYMENOPTERA. Howard, L. O.**—A note on the Indian enemies of Aleyrodes citri, with description of a n. sp. of Prospaltella, **179,** iv, 130-132 (*). **Kieffer, J. J.**—Description de nouveaux Hymenopteres, **159,** iv, 105-117 (*). Nouveaux Cynipides exotiques, **159,** iv, 329-342 (*). Fam. Scelionidae. Addenda et corrigenda, **194,** 80b fasc., 61-112. **Schmeideknecht, O.**—Opuscula Ichneumonolgica Fasc., xxvii, p. 2081-2160. **Strand, E.**—Zwei neue sudamerikanische Stenophasmus (Stephanidae), **38,** xxx, 14-15. **Trani, E.**—Di un nuovo Proctotrupidae parassita delle larve degli Anthrenus musaeorum, **314,** lxi, 19-24. **Viehmeyer, H.**—Hochzeitsflug und Hybridation bei den Ameisen, **305,** ii, 28-30.

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A Synopsis of the Orthoptera of Western Europe.—By Malcolm Burr. London, 1910. 160 pages. Oliver Janson, 44 Great Russell Street, W. C. Price *3s. 6d.*

This most useful handbook first appeared in parts in the *Entomologist's Record and Journal of Variation,* forty-three installments having been published between 1903 and 1909. In the present little volume the matter is presented as first published with several pages of addenda dealing with corrections of classification and nomenclature and certain additional more recently described species.

The treatment is concise, yet full enough to serve the purpose of the work, which the author says "does not claim to be more than a pocket-handbook for the use of collectors in the field."

The geographic scope of the work covers the region "west of Vienna," to pass beyond which "would mean the inclusion of Eastern Europe, with Russia, and the Balkans." It might be well to emphasize even more strongly than the author does the fact that the present work is the first of anything of a similar character published in the English language, our great works of reference on European Orthoptera being in German, French and Spanish.

The generic tables seem to be very carefully constructed, while the specific tables present in most cases a wealth of differential characters instead of the meagre alternatives so frequently found. Under the species are given very graphic descriptions with beclouding technicalities reduced to a minimum, while such as are used are explained under the family headings.

The geographic information is of the sort which makes one who is more than a taxonomist happy, as the author has the ability to give in a few terse sentences a clear yet fairly detailed statement of the range of a species, generally prefacing the limitations of the range with the general region or regions inhabited.

The number of species of Forficulidæ treated is twenty-four, of Blattodea twenty-two, of Mantidea thirteen, of Phasmidea four, of Acridiodea one hundred and thirty-five, of Locustodea one hundred and sixty-one, of Gryllodea thirty-five. On tabulating the species according to the sections of Western Europe to which they are restricted one is first struck with the great number of Iberian (Spain and Portugal) forms, thirty-three Acridiodea, sixty-three Locustodea and fourteen Gryllodea being found nowhere else in the territory covered, a few of them being found in northern Africa as well, although the vast majority are indigenous to the peninsula. The next numerical element in a tabulation of the species is a Mediterranean one, including species found in Spain and Portugal as well as the south coast region of France, Italy and the portion of the Adriatic country covered by the work. The Acridiodea of this element number twenty-eight, the Locustodea forty-eight and the Gryllodea ten. The boreal element is numerically far less than either the Iberian or Mediterranean elements.

In the reviewer's opinion the splitting up of the old blanket genus *Stenobothrus* (pp. 27-28, 32-47) is greatly to be commended, although the author may not be universally followed in according the divisions generic rank. Although Bolivar had previously applied these divisions in a subgeneric sense to the Iberian species, the present work is the first to assign the more numerous extra-Iberian forms.

A curious lapse occurs near the bottom of page 16 where *Blatta germanica* is used instead of *Blatta orientalis, germanica* being properly used on the middle of the same page. The latter species, our familiar

Croton-bug, we are told is called "Prussian" in Russia and "Russian" in Prussia.

To our brother Orthopterists we would commend this Synopsis as a model of what such a condensed manual should be, and we earnestly hope the day may soon come when our own country will have such handbooks of not only the Orthoptera but other orders as well. To our English friend, who has put so much time and love into the compiling of this work, we give our grateful thanks for what we know will be well thumbed by others as well as ourselves.—J. A. G. R.

## Doings of Societies.

### ENTOMOLOGICAL SOCIETY OF AMERICA.

The fifth annual meeting was held at the University of Minnesota, Minneapolis, December 27th and 28th, 1910, in the School of Mines building. The president, Dr. J. B. Smith, presided throughout the session. In the absence of the Secretary-Treasurer, Professor J. G. Sanders was elected Secretary pro tem.

The following papers were read during the session:

E. L. Dickerson.—"Notes on the Tingid *Leptobyrsa explanata* Heid."

J. B. Smith.—"Notes on *Sanninoidea exitiosa.*"

J. P. Jensen.—"The structure of spermatophores in crickets."

S. J. Hunter.—"The biological survey of the insect life of Kansas."

H. C. and H. H. Severin.—"An experimental study of the death-feigning habits of *Belostoma* (*Zaitha*) *flumineum* and *Nepa apiculata* Uhler."

C. H. T. Townsend.—"Announcement of further results secured in the study of Tachinidae and allies."

T. D. A. Cockerell.—"Some suggested rules to govern entomological publications."

The report of the Committee on Nomenclature was received and ordered printed.

The report of the Executive Committee showed that nineteen new members had been received during the year and four lost through death.

The result of the mail vote ordered by the Society at the Boston meeting was, that the annual dues of the Society should be two dollars, this to include a subscription to the Annals of the Entomological Society of America.

The following officers were elected: President, Professor Herbert Osborn; First Vice-President, Professor Lawrence Bruner; Second Vice-President, Professor Alex. D. MacGillivray; Secretary-Treasurer, Professor Alex. D. MacGillivray.

Additional members of the Executive Committee: Professor J. H. Comstock, Professor J. B. Smith, Professor C. J. S. Bethune, Dr. W. M. Wheeler, Dr. H. Skinner, Dr. A. D. Hopkins.

The Annual Public Address was given in Handicraft Hall by Professor F. L. Washburn: "The Typhoid Fly in the Minnesota Iron Range." ALEX. D. MACGILLIVRAY, *Secretary-Treasurer.*

## FELDMAN COLLECTING SOCIAL.

Meeting of Dec. 21st, 1910, held at 1523 S. 13th St., Philadelphia. Twelve members present; Mr. Lewis H. Traunweiser, visitor. President Harbeck in the chair.

Prof. Smith commented on the different departments of the colleges he visited in Europe and said he was surprised at the amount of entomology taught in connection with the medical courses, which of course is mostly on insects which are carriers of disease. He gave details of his trip, which was for the purpose of looking up the water plant *Azolla* to be used in exterminating mosquitoes, and which was described in the NEWS for December.

A copy of the new New Jersey list of insects was shown.

Mr. C. T. Greene exhibited and recorded the following Diptera, all collected by himself: *Masicera albifrons* Town., Castle Rock, Pa., VIII-29-'09; *Chaetona nitens* Coq., Wenonah, N. J., IX-5-'10; *Tachytrechus moechus* Loew, Bromall, Pa., VII-1-'10; and *Gymnopternus chalcochrus* Loew, Wenonah, N. J., V-15-'10.

Dr. Castle said that on his trips to Florida he had taken

twelve species of *Chlaenius* and had succeeded in adding two to this on his latest trip, *C. maxillosus* Horn and *herbaceus* Chev. Of the former he believed that only two specimens were known and that it was not represented in the Horn Collection, while the latter was represented by one specimen.

Mr. Haimbach invited the Social to hold its next meeting at his home, 150 Sumac Street, Wissahickon. Adjourned to the Annex.

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Meeting of January 18, 1911, at the home of Frank Haimbach, 150 Sumac Street, Wissahickon, Philadelphia. Thirteen members present. Prof. F. M. Webster, of Washington, D. C., visitor. President Harbeck in the chair.

The President read his annual address which was ordered to be incorporated in the minutes.

The following officers were nominated and elected to serve for the year 1911: President, F. Haimbach; Vice-President, H. A. Wenzel; Treasurer, H. W. Wenzel; Secretary, George M. Greene; Assistant Secretary, C. T. Greene.

Prof. Smith said that two or three months ago, just before the bad weather, he had received word that something was turning up the ground in Cape May County. He sent Mr. Brehme down to Sea Isle Junction, and found that it was as he had supposed, the Periodical Cicada, but these insects instead of making chimneys, had made mounds like ant hills, the openings of which did not come through to the top but just caused upheavals of the ground. The burrow was followed for six feet but did not reach the bottom and therefore no larvae were secured. In one place Italians were making a cut of eight feet but still the bottom of the burrows had not been reached. He stated that later some larvae had been sent to him from a locality where there was shale and they could only go to the depth of a few inches.

Mr. Wenzel described the manner in which he had dug for *Bledius*.

Prof. Webster mentioned the collectors and collections in a

general and humorous manner and then gave an interesting talk on imported species of several orders, particularly as to their wide distribution. One species, a fly, was bred by Mr. Johnson, from the University grounds here and later turned up in Arizona. He stated that many varieties of insects were imported to this country by the Spaniards, years ago, and also that the distribution of the different species was largely aided by the Jesuit priests in their travels through different countries when they carried with them grains and fruits gathered at points where they stopped.

Mr. Wenzel exhibited a live, wingless female grasshopper, *Aptenopedes sphenarioides* Scudder, collected by Mr. Schmitz in the street at noon of the date of the meeting, the temperature at that time being about 25 deg. Fahrenheit.

After an elaborate musical program furnished by Mr. Haimbach's family and friends, the members were invited to the dining room, where they were again well entertained.

GEO. M. GREENE, *Secretary.*

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## AMERICAN ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

The twenty-third annual meeting of the American Association of Economic Entomologists was held at Minneapolis, December 28 and 29, 1910. The full proceedings are published in the *Journal of Economic Entomology* (the official organ of the Association) for February, 1911. Some of the more interesting features of the proceedings were: The consideration of a committee report on a proposed affiliation of the Association with ten other non-entomological societies under the name of the Affiliated Societies of Agricultural Science, a general meeting to be held biennially; each affiliated society to retain its own organization and to hold such other meetings as it may elect and to issue its own Proceedings, but the Proceedings of all to conform to a uniform style of page, paper and type. The report of the committee was received and the com-

mittee continued. The President's address by E. Dwight Sanderson, was "The Work of the American Association of Economic Entomologists." Prof. T. S. Headlee presented a brief report on the work now being prosecuted by some economic entomologists in the State universities, agricultural colleges and experiment stations of the United States, listing the names of 101 projects, and the investigator undertaking each one, with his address.

The adoption of a preamble and resolution that, *"Whereas,* there now exists a great lack of properly trained men for the work in economic entomology in the country at large, be it *Resolved,* by the Association that universities and agricultural colleges within whose province it naturally falls to supply this need, be urged to provide adequate facilities for the thorough training of capable men for the profession of economic entomology."

A symposium on the present methods of teaching entomology, is represented by four papers by Profs. J. H. Comstock, H. T. Fernald, Herbert Osborn and Lawrence Bruner respectively, followed by an extended discussion.

The same number of the *Journal of Economic Entomology* contains the Proceedings of the ninth annual meeting of the American Association of Official Horticultural Inspectors, including an extended paper by C. L. Marlatt on the need of a national control of imported nursery stock, and shorter ones by Dr. L. O. Howard, G. G. Atwood and F. Windle.

## OBITUARY

James William Tutt, English Lepidopterist, and Editor of the *Entomologists' Record and Journal of Variation* (London), from 1890 to 1910, died January 10, 1911, at Rayleigh Villa, Westcombe Hill. From a sympathetic notice of his life by Dr. T. A. Chapman, in the *Entomologist* for February, 1911, we learn that he was born at Strood, Kent, April 26, 1858. Most of his mature years were spent as a schoolmaster

in London. He began contributing to the *Entomologist* in 1884, was an active member of the City of London (President 1896-1899) and South London (President 1899) Entomological and Natural History Societies, a Fellow of the Entomological Society of London since 1885, and President-nominate of this last at the time of his death. His chief papers and books are on *Melanism; The British Pterophorina; Migration of Insects; The British Noctuae and their varieties* (4 volumes): *Practical Hints for the Field Lepidopterist* (3 volumes); *British Butterflies; British Moths; Randoms in Alpine Valleys; Woodside, Burnside, Hillside and Marsh; Random Recollections* and, lastly and chiefly, *A Natural History of the British Lepidoptera,* of which six thick volumes have appeared, I-V, 1899-1906, treating of Moths, and VIII, 1905-'06, of Butterflies. These last, says Dr. Chapman, "are noteworthy not only for their encyclopedic character in relation to each species handled, but also for the critical discussions on many points of classification and nomenclature. This, however, is not the place for further review, beyond noting the evidence afforded of Tutt's amazing industry, and the width and vigor of his mental grasp." Elsewhere Dr. Chapman remarks, "It was simply impossible for him to be idle; he must work away at full steam all the time."

"His extensive collections, occupying some dozen cabinets are less remarkable for the rarities they contain than for presenting many long series, and for being very largely of his own collecting. It is stated that they are to be disposed of during the next two years."

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From our contemporaries also we learn of the deaths of the following entomologists:

E. A. Levielle, at the age of 70 years; Edwyn Carlos Reed, Director of the Museo de Concepcion, Chile, on November 5, 1910; Elzear Abeille de Perrin, Coleopterist, at Marseilles, aged 68 years, and Prof. Giron, Lepidopterist, of the Belgian Entomological Society.

# EXCHANGES.

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**Butterflies**—I will name **spread** North American butterflies. Many rare species for exchange.—Dr. Henry Skinner, Logan Square, Philadelphia, Penna.

**Wanted**—Specimens of the Coccid genus *Lepidosaphes* (formerly *Mytilaspis*) for study. Will name and return.—H. T. Fernald, Amherst, Mass.

**Japanese Butterflies** and others. *Papilio, Charaxes, Hestinia, Euripus*, Saturnids, Sphingids from Formosa. Wanted Butterflies from any part of the world, especially tropical region.—T. Fukai, Konosu, Saitama, Japan.

**Cocoons** and chrysalids of *C. promethea* and *P. troilus* for exchange for Lepidoptera in papers.--Edwin P. Meiners, 2624 N. Garrison Ave., St. Louis, Mo.

**Catocalae** and other Lepidoptera. Eggs of *innubens, cara, amatrix, ilia piatrix* and hickory feeders. Also pupae of *regalis, imperialis, luna, modesta* and *P. ajax, troilus* and *cresphontes*.—H. A. Davenport, R. D. No. 3, Louisiana, Mo.

**Lepidoptera** for exchange from 1910, on pins, all named; also pupae of *cresphontes, troilus, turnus* for others.—F. Mulkmus, 3735 Cottage Ave., St. Louis, Mo.

**Wanted**—Elateridae and Buprestidae for other named Coleoptera. I also desire to exchange entomological bulletins of the various Experiment Stations for others not in my library, and for bulletins on plant pathology. Send lists.—C. O. Houghton, Delaware College, Newark, Delaware.

**Lepidoptera** on pins from this locality for exchange.—Ernst Frensch, Box 622, Stonington, Conn.

**Wanted** to purchase, or obtain by exchange, living pupae of *Papilio turnus* from the South and West.—John H. Gerould, Hanover, N. H.

**Will sell for cash** a complete set of Illinois Geological Reports, or will exchange for technical entomological writings; those dealing with parasitic insects preferred.—J. E. Hallinen, Interlaken School, Laporte, Indiana.

**For Sale or Exchange**—Living pupae of *A. luna* and *A. ajax;* also adults of *Anthocharis pima* and *sara*, both perfect and second.—N. Weil, Calhoun, McLean Co., Kentucky.

**Wanted For Cash**—Can. Ent., Vol. xxx, xxxi; Riley's First Missouri Report and other papers on North American entomology not in my library. Send lists.—W. Beutenmuller, Am. Mus. Nat. Hist., New York, N. Y.

**Wanted**—Bibliography of Economic Entomology, Part 6; Div. of Entomology, New Series, Bull. No. 15; Technical Bulletin 1; Old Series, Bulls. 1, 2, 4, 5, 8, 9, 10, 11, 12, 13, 18, 20, 26, 28, 30 and 33. Will pay cash or exchange.—Charles W. Hooker, Bureau of Ent., Washington, D. C.

**Wanted**—Correspondence with collectors of Lepidoptera desiring to take a trip of from 1 to 2 years in Malay Archipelago, or following the course of Amazon River in Brazil.—A. F. Porter, Decorah, Iowa.

**Wanted**—Living eggs of tent caterpillars (*Malacosoma* spp.) from the western United States. Kindly indicate food plant. Exchange or cash.—C. R. Crosby, 43 East Ave., Ithaca, N. Y.

**Wanted** No. American Buprestidae and Cicindelae. Will name and return Coleoptera in certain families for specimens of the above. Duplicates for exchange.—C. A. Frost, 40 Grant St., So. Framingham, Mass.

**For Exchange**—Eggs of *Hemileuca maia*, Cicindela and Lepidoptera in paper packages. Desire exotic or native butterflies and beetles.—A. Mares, 2517 So. Homan Ave., Chicago, Ill.

**Pupae** of *P. modesta*, *Sm. excaecatus*, *S. eremitus*, *P. troilus*, *cresphontes*, cocoons of *luna*, *promethea*, *polyphemus*, *cecropia*, *chrysalids of Catocala illecta* in May and other species later. Butterflies and moths in papers and on pins.—R. R. Rowley, Louisiana, Mo.


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